SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME X FEBRUARY, 1910 NUMBER 2

CHRONIC OSTEOMYELITIS, DIAGNOSIS AND TREATMENT[1]

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THIS pathologic condition comprises all those inflammations of bone which have lasted for some time. The term osteo-periostitis is used less because the conditions rarely exist without simultaneous osteomyelitis. The cause of this inflammation is, in most instances, due to an infection with some kind of a micro-organism, or several micro-organisms at the same time. Predisposing, but not necessarily existing, is an injury, particularly an injury with a great deal of destruction or laceration.

If we look over the histories of many cases of osteomyelitis we find as a rule that they have started insidiously, often manifesting the symptoms of typhoid, malaria, or other ill-defined fever diseases. In some instances a sore throat has been the starting point of this disease. Among the micro-organisms which cause the greatest destructions are the common pus microbes, and those of tuberculosis; but any other micro-organism, like the germ of pneumonia, typhoid, scarlet fever, measles, and others, may be the cause.

The invasion of the bone by the germs leads to an infiltration of the periosteum, or the spongious portion of the bone, to a blocking of circulation, and gradually to the death of cells to a smaller or larger extent. After necrosis has occurred a reactive inflammation tries to eliminate the dead tissue, by crumbling or softening, which means the formation of an abscess. Granulation tissue forms often in slow and not very virulent infections, imbedding the dead tissue like a foreign body, and in that manner cavities filled with granulations and dead bone and abscesses are formed. At times the pressure of the pus breaks such barriers as the bone may offer, forming a fistula towards the outside. In rare instances the pus may break through into a neighboring joint, and infect it. One of the most common occurrences, however, is that new bone is formed by the deposit of chalk, within this granulation tissue, or by growing from the periosteum around dead pieces of bone, so that occasionally an entirely new bony case is formed of the shape of the old one, closing within its walls the dead bone or sequestrum.

The *symptoms* of this disease are local and general. The local symptoms consist in a swelling (œdema) of the soft parts surrounding the bone, and often an abscess within these tissues. The general symptoms are those of a local septic infection, namely, fever and pain, and an impaired function.

Prognosis. If left alone, such chronic cases remain the long, tedious suppuiraton, sometimes, however, with relative good health of the patient. Very seldom do they cause grave symptoms, unless the flow of pus is blocked in some way. If properly treated most of them heal out with good function of the limbs.

I shall confine my remarks to the subject of chronic suppurative osteomyelitis, with bone sequestration, and exclude tubercular and syphilitic osteomyelitis. This will narrow

[1] Read before the Chicago Surgical Society, December 7, 1909.

Case 1. After operation; wound kept widely open after removal of gauze packing.
Below: Sequestra removed from humerus.

the field down to a class of cases well known to the surgeon. It comprises a large number of chronic invalids, who are afflicted with solitary or multiple foci of chronic inflammation of bone, usually the long bones with suppuration. These patients are operated upon usually more than once, and very often after one or more unsuccessful attempts to heal their bone lesions, either left to their fate uncured, or their lesions heal spontaneously after long time. They are often not sick enough to be confined to bed or to the hospital, and becoming weary of surgical treatment dress their wounds themselves and take their fate with resignation. Unless their fistulæ become temporarily blocked up they do not suffer much pain. The only inconvenience they suffer is the constant discharge of pus and the necessity of dressing. It has been our luck to observe a large number of this class, especially during the past few years, and we have paid a good deal of attention to this pathologic condition. Contrary to my former dislike of these cases on account of their stubbornness, I become more fond of their care the more difficulties they offer, and to this fact I owe the observation of a larger number, probably, than fall to the lot of most of the surgeons.

I have observed that most of these cases have about the following experience: At first their trouble is not recognized for a longer period. They are regarded as rheumatism, malaria, or other ill-defined diseases until the localization becomes clearly confined to a limb, and an abscess appears on the surface. This opens spontaneously or is lanced, not by a surgeon, but in the majority of instances by a general practitioner. With the opening of the abscess the subjective symptoms are greatly diminished, and a treatment with dressing and washing begins. This does not heal the abscess and the surgeon is consulted. In most instances he recognizes the bone lesion, and sounding and scraping begins. This is followed by one or more so-called radical operations. The more progressive and scientific men make an extensive operation, remove particles or larger sequestra, pack the cavity with gauze and expect cure, which really follows in some cases. In most instances, however, the cure lasts too long, the patient disappears from their observations, and since he is practically without symptoms, except the pus discharge, he goes on untreated. In many cases healing occurs even after a long period, sometimes with the discharge of a few spicula of bone. But in the majority of our observations the cases remain with one or more fistulæ, and in this condition they come to our care. I must say that I have among my cases some who have been treated by the very best surgeons of this country and Europe, operated on more than once without success. For a long time my experience has been the same, and in some cases I am still unable to produce a cure, but I have cured cases in which others failed, and this led me to try to find out the cause of these failures in the individual cases. In most of them I have been able to find it.

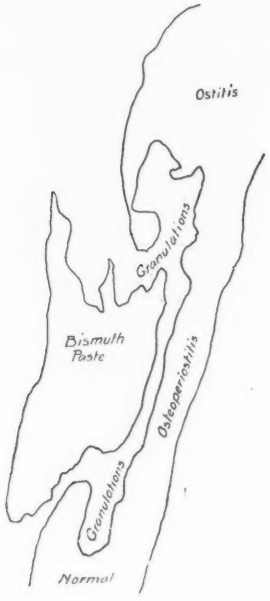
It is the object of this paper and this demonstration to show on a number of selected cases these conditions, and to analyze them. Before doing so I must discuss some of the pathologic features of chronic suppurative osteomyelitis. The cause of this condition as said before, is an

Case 1. Before operation; indicates neoformation of bone, several sequestra, and granulation around the same.

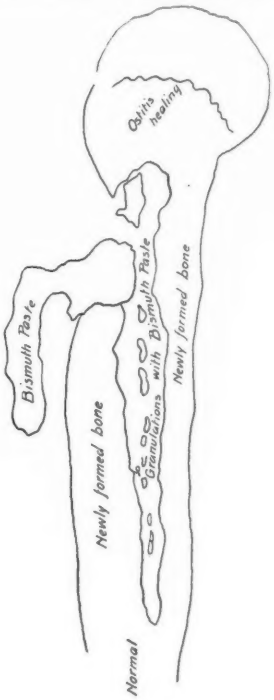
infection with strepto- and staphylococci, or other micro-organisms. The inflammation following an invasion of these germs leads as in every other locality to a melting process of the tissues, to the formation of an abscess. In the bone the abscess leads quicker to a local necrosis than in any other locality or structure, on account of the lack of elasticity of the tissue. Smaller or larger parts of the bone are deprived of their nutrition, and die. These necrotic parts are gradually, often after a long period, entirely loosened from the surrounding living tissue, and lying within a cavity of pus or within granulations, they remain foreign bodies. Like anywhere else the living tissue around these sequestra answers by the formation of a reactive sclerosis, which is corresponding in its value to the abscess membrane in soft tissues. This sclerosis within the bone is what I wish to call your attention to, because it is very important for the diagnosis and for the course of treatment of this condition. Like any other abscess, the bone abscess is either self-limited, and gradually becoming sterile, so that the sequestrum lies within a sterile cavity and it may heal in or rather never bother its possessor; or the abscess may dissolve the wall, break

Case 1. Injection of bismuth paste, showing that all sequestra have been removed.

through it, and empty its contents outward, through a fistula, then it may close. The third and most common possibility is that the reactive inflammation leads to new formation of bone, with the thickening and gradually harder bone around the old and dead one, with one or more safety valves or openings, through which the pus keeps coming permanently, until the sequestrum is broken up into shreds by leucocytes and these shreds or spicula are discharged. This procedure is so common in this pathologic condition that it has become a pathognomonic symptom. A probe entering through one of these openings will strike rough bone, and thus the diagnosis is established. But the diagnosis is not always as easy as this, the probe might not strike the bone, and may not even be able to enter into the bone cavity. A most valuable aid in the diagnosis came to us through the X-ray. It made the structure of the bone visible, and conditions of the same were revealed which would have been otherwise absolutely hidden, and never diagnosed. Unfortunately not a proper use is made as yet of this method, and many surgeons and radiologists are still of the opinion that the diagnosis of an abscess or sequestrum in the bone by the rays is impossible. For the average observer this is true, but careful study and particularly the systematic examination of the cases in a manner which I shall describe hereafter has satisfied me that such a diagnosis

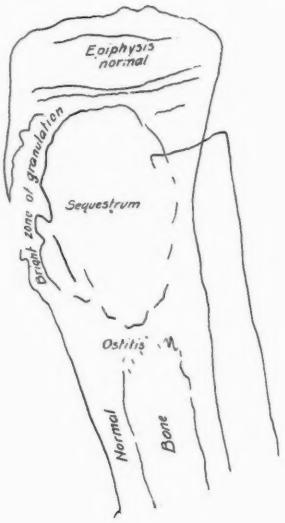


can be made with great accuracy. I have added a new method of diagnosis of these conditions by the diagnostic injection of bismuth paste, which penetrates the fistulæ and often outlines the cavities with great clearness. But inasmuch as the paste cannot dislodge blood and granulations it is not an absolute outline, and will not aid as much in the understanding of the condition as when compared with the uninjected picture. The injection of this mass is invaluable, and has led us to find the origin and the focus in many a case which would otherwise have been hidden. A striking example of its value was given to me while abroad last year. I attended the clinic of a celebrated European surgeon, to whom I just had explained the diagnostic value of these injections. He seemed to give little credence to it. By a peculiar chance or rather by the manipulation of his assistant, who took very kindly to that proposition, a case was brought into the clinic the same morning, of a fistula opening on the lateral surface of the femur. The professor explained to his audience, mostly post-



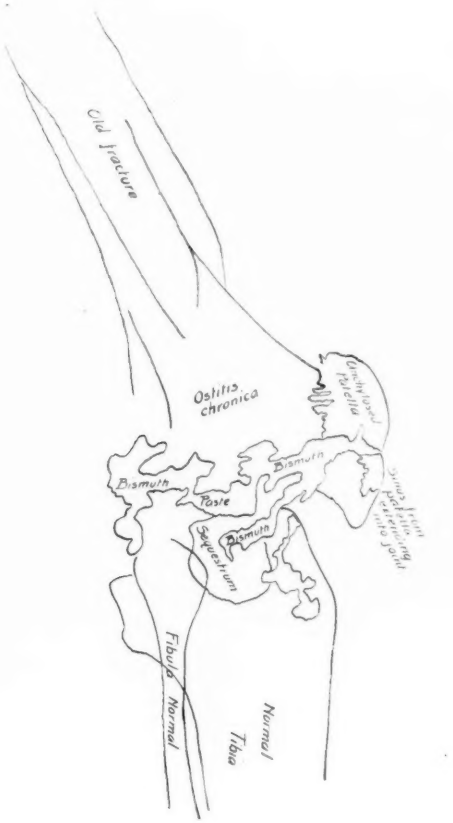
Case 1. Shortly before closure of fistula. Within the bone is some paste, in place of sequestra, enclosed in healthy granulations.

Case 2. Large sequestrum in the upper part of the tibia, below epiphyseal line.



graduates, that the fistula led to a focus of osteomyelitis of the femur, and exhibited a very good X-ray picture, which showed some mottled condition of the bone near the trochanter major. He began his operation by dissecting the fistula, but the tract led high up towards the anterior surface of the bone and did not seem to go in the direction suspected by him, and after working for over one hour and chiseling away some apparently healthy bone, he abandoned the case. His assistant injected the tract afterwards, at my suggestion, and we saw it go up to the appendical region. I heard afterwards that the professor is using the diagnostic injection ever since.

If not properly done this injection will mislead rather than help, as I may be able to show you in some pictures. The proper way of diagnosing a case of suppurative osteomyelitis is to take several pictures in a certain rotation and study them carefully. It is the greatest mistake made as yet that very few surgeons diagnose their own radiographs, but rather leave it to a special radiologist. One does not need to take the picture himself, but the radiologist has hardly ever clinical experience enough to judge pathologic conditions, and if the surgeon has no radiologic experience he is often better off without a skiagram than with one that is misleading. I am sorry to say, however, that such is the rule of our practice, that the surgeons leave it to the radiologist without clinical experience to take a picture in any manner he himself sees fit. The only way to diagnose an osteomyelitis with a sequestrum is the following: First, take a picture of the region supposed to be pathologically changed. It may not be the seat of the trouble, but it will lead the way in diagnosis. This picture has to be studied, and often will give to the experienced observer the diagnosis. Second, a picture is taken with an injection of bismuth paste, preferably stereoscopic, and it will yield usually a clear diagnosis. If something peculiar or unexpected has been found in the first picture that does not fit exactly our idea of the pathologic change present, we take a second control picture without bismuth, to satisfy ourselves whether that peculiarity is not



Case 2. Complicated fistula tract with one sequestrum left behind after first operation.

technical impurity or accident. A sequestrum can be readily made out, and often more than one, and their relation can be ascertained in stereoscopic views. It appears as dark shadow with more or less clear outlines, surrounded by a halo of clear tissue. This clear halo is apparently due to the permeability of granulation tissue to the rays. Then again, a darker outline of a shadow indicating the sclerotic reactive ostitic shell.

After an operation has been performed, and the sequestra have been removed, the cavities are transformed into healthy cavities, and then another injection is made. This gives to us a control picture, showing whether everything pathologic has been removed. This injection has been used by us also as a treatment, as we have found by experience what others have ingeniously found before (Senn and Mosetig-Moorhof,) who have tried bone chips and the "Plombe" to obliterate such cavities, and what the dentists use by plugging carious teeth with gold or other material. Bone cavities cannot be obliterated unless they have one of the most important requisites of wound-healing, namely, the coaptation of the wounded surfaces, even if it were only by granulations. If the wound borders cannot reach each other the cavity will keep on suppurating forever.

The treatment, however, of chronic osteomyelitis with suppuration is purely surgical. As I have stated before, the pathologic changes lead to sequestrum formation. In rare instances a spontaneous cure may result. But in most instances the fistula which forms spontaneously or by lancing of an abscess will result, and here only a radical operation can

Case 2. Injections of paste into the cavity left by removal of sequestrum after second operation.

come into question. Such an operation, however, should not be undertaken unless by a series of X-ray pictures the extent of the lesion has been clearly diagnosed. As I can demonstrate on a number of cases, the diagnosis is possible, and has been verified by us in almost every instance. We must admit that we have learned only recently how to go about it to make such an operation radical enough, and since that time our results have been better. While we formerly had cases, and still have some in which a healing does not take place in a short time, say four to six weeks, the failures become less frequent with our improved technique. This technique and the after treatment I can touch upon briefly, speaking to surgeons. We use Esmarch's constriction wherever we can, make broad and long incisions, and openings into the bone with "fraise" or chisel. When transforming the granulating cavity into a clean one, eventually we remove by subperiosteal resection large pieces of bone. The periosteum forms new bone. How much bone can be re-formed I can show you in one case in which a surgeon removed the whole lower jaw, but fortunately left the periosteum. The entire lower jaw has formed anew, of course in a much smaller size, because he omitted to introduce a prothesis.

I shall not discuss the different incisions which we have changed from our new experiences. So, for instance, we do not incise the femur on the side any more, but in front. In all our last cases this has proven a great deal more beneficial to make a radical operation, and to get a better cure in shorter time.

The main object of this paper was to show the necessity of corrèct diagnosis by systematic X-ray examination, and the absolute necessity of radical operation if we want to obtain results. Diagnosis without radical operation I can show you on these pictures, without removal of the sequestra, will never result in a cure. Radical operation, on the other hand, as I can show you also in some cases, without a correct diagnosis, will do more harm than good. For instance, if a surgeon removes three-quarters of the femur, as in one of these cases I am showing you, it is radical enough, but our picture shows that the trouble lies in the pelvis. Also, if a surgeon removes the whole jaw, and nine-tenths of it is normal, it is radical enough; but if he does not put in a prothesis or does not prevent the periosteum from shrinking, the case will be very disastrous. Correct diagnosis and radical operation must go together.

From the large number of cases demonstrated I shall select for this publication only three, which seem to me most illustrative for the point of diagnosis made within this paper.

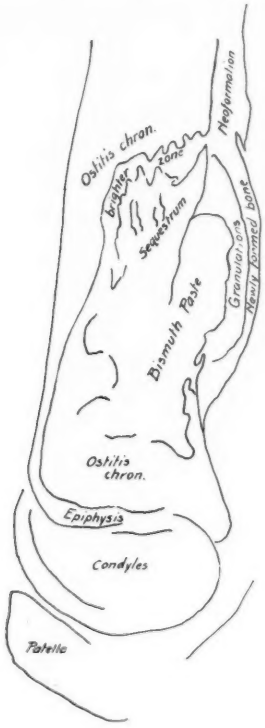
Case 1. G. W., a boy of thirteen, with chronic osteomyelitis of his humerus, was brought to me for operation. He had been suffering for over one year with his trouble, namely, a running fistula of his arm, which had been operated on twice, without success. The examination showed very much thickened bone of some irregular contour extending from the head of the humerus down to about the middle of the arm. On the outer side of the arm is a fistula, within a scar, showing the entrance of the former operations. The first picture taken shows several large sequestra, imitating more or less the shape of a normal upper third of the humerus, imbedded in granulations. The skiagraphs show distinctly the darker shadows of the sequestra, the brighter zones of granulation around them, and the darker shades of newly formed bone again on the outside. The carbon prints outlined from the photographs show the exact location of these changes. The operation removes the sequestra as shown in another photograph, and corresponding in their outline exactly to the skiagraph. An injection with bismuth paste after the operation shows the extent of the cavity left

Case 4. Shows new formed bone clearly; surrounding large cavity filled with paste and a sequestrum.

by the removal of the sequestra, and filled with granulations and blood. Another picture several months after, when the whole process is healed, shows the retraction and absorption of the paste, and new formed bone, and restoration of some of the old inflamed bones to normal conditions. The case has remained healed ever since.

Case 2. A boy, of twelve years, with a large sequestrum of the size of an egg in his tibia, has been treated for several months at the hospital, for different diseases, typhoid, malaria, sepsis, and so on. Finally a swelling appears on the front surface of the tibia. An incision is made, pus is discharged, but a fever keeps up; septic symptoms appear again, another incision is made, a drain introduced, but no picture taken. Patient is no better. At this stage writer of this is consulted. He recommends the taking of an X-ray picture. Two radiographs are taken, both demonstrating clearly the sequestrum of the size of a hen's egg in the tibia, with the same characteristic outlines of sequestrum granulation and newly formed bone, as in the first, — however the latter not marked so much, as the case is one of subacute character. A sequestrotomy is performed, and the cure follows within a few weeks.

Case 3. Osteomyelitis, chronic, of the femur, the tibia, and chronic suppurative ankylosis of the knee-joint. Mrs. F., 48 years old, had sustained a fracture of the femur, with dislocation of the fragments several years ago, subsequently developed a slow fever and a swelling around the knee-joint, and inability to walk.



The first picture of her shows that the femur is most affected and also the patella. It appears that the patella contains some dead bone. The operation reveals an abscess, leading into the patella, and three sequestra are removed from the same. The patient is much better after this operation, particularly healing rapidly after the injection of the bismuth paste. After closure of the fistula, however, the patient keeps on suffering lower down in the neighborhood of the head of the tibia. A number of pictures are taken, and they all reveal that a sequestrum has been left behind, of the size of a hazel-nut, in the head of the tibia. A third picture after removal of this sequestrum shows the outline of the cavity taken in by this sequestrum very distinctly, by the injection of bismuth. In both these pictures the outlines of the sequestrum are so clear that they cannot be overlooked.

A fourth case is shown in another picture, in which the newly formed bone shows particularly clear, and also a sequestrum within a cavity in which it has been for some time. This sequestrum, however, was not removed, as the patient improved so much, even with the sequestrum left behind, that he refused operation.

THE VESICULÆ SEMINALES[1]

Anatomico-Surgical Study

By CHARLES E. BARNETT, M.D., Fort Wayne, Indiana

THINKING that the anatomy, from a surgical standpoint, had probably been underdone, in the study of the seminal vesicles and considering that many of our text-books were handing down opinions derived from the older works, that had been compiled before the seminal vesicles had any prominent standing in surgery — last winter, while in Vienna, the writer did more than one hundred bladder dissections with the seminal vesicles as the potential point for investigation.

Location. Just under the rectovesical fold junction of the peritoneum filling in a triangular space between the bladder and rectum whose apex corresponds to the post-prostatic fissure, lay the vesiculæ with the vasa ampullæ between (see Fig. 1). The upper two-thirds at least of the vesicula is supra trigonal.

The external superior border marks the ureter, which is anterior to it, dipping into the bladder muscularis.

The vas, considerably convoluted, is found surrounding the superior border.

The seminal vesicle with the convoluted vas surrounding its superior border along with the ampulla attached to the middle border is enveloped by a loosely connected tissue, the vesicle itself being surrounded by a thoroughly independent capsule.

Fig. 1. Shows the prostate; the seminal vesicles, with the vasa ampullæ partially dissected away. Shows the ejaculatory ducts running into the prostatic fissure. This is the normal relation of the vesicles to the prostate. (Both the vesicles in this case are pathologic.)

[1]Read before the American Urologic Association, Atlantic City, June 19, 1909, in Symposium Uro-Genital Tract.

Size. The size varies to a marked degree even in the same subject, yet they are found larger than most descriptions would indicate. So the old anatomical saying "that they are contained within the trigonal lines" is almost always disproven. The accompanying photograph (Fig. 2) shows that should this trigonal space contain only one vesicula it would be overcrowded.

The ureteral measurement from its bladder meatus to the superior external border of the vesicle where the ureter crosses was usually about two inches. So that portion of the vesicula would necessarily be extratrigonal.

This measurement refers to biological rather than pathological vesicles for the pathologic ones were more often atrophic rather than hypertrophic.

Fascia. The vesicles lay between the recto-vesical portion of the levator fascia but running

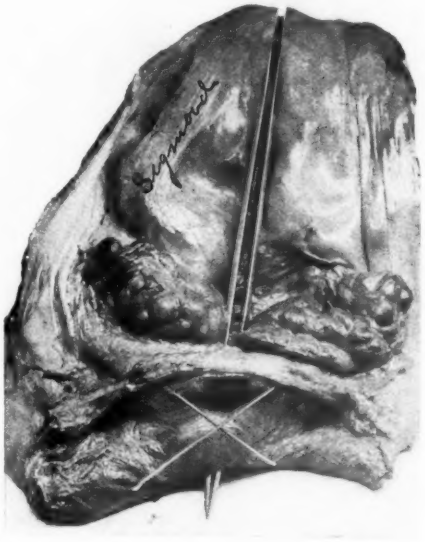


Fig. 2. Shows the vesicles from the adominal side; the peritoneum is lifted off at the recto-vesical fold. You see the sigmoid coming down from behind. In front the "chopped off" bladder is seen showing the prostatic urethra in the center; sounds passed up ureteral openings outline a reversed trigon which illustrates the difference between the size of the trigonal space and the size of the vesicle. The dissecting forceps pass down through the post-prostatic fissure and emerge through the sinus pocularis into the membranous urethra, demonstrating one vulnerable way up to the vesicles.

Fig. 3. Shows the vesicle lifted out from just under the peritoneum, showing the vesicle and convoluted vas pressed away by tissue forceps in order to demonstrate more clearly the post-vesicular fold of fascia, whose free edge is shown just to the right of the vesicle. The fascia is pulled taut by a thread above and a hæmostatic forceps hanging from below.

from the prostatic fascia is a distinct post-vesicular fold of fascia that extends almost to the outer border of the vesicle. The outer border of this vesicular fascia is quite free and can be easily lifted from the vesicle. (Fig. 3.) A knowledge of this fascial fold would lead the operator to the vesicle around the posterior border of the prostate, when operating perineally and would protect the rectum from puncture when the operator's finger was on the vesicular side when operating from above. On the bladder side the fascia is not well marked and more caution must be used against puncture.

Vascular pole. The vesicle can be enucleated down to the ejaculatory duct and away from the vas ampulla except at the superior external pole; there the vessels and connective tissue concentrate and that portion must needs be ligated off before the vesicle can be removed. (Fig. 4.)

This vascular pole is also connected with the ureter which marks the ureteral cross (X) at this point with the vesicle and vas deferens.

Fig. 4. Shows the recto-vesical peritoneum lifted, with the vesicles looking towards the bladder, with either vas deferens running into the post-prostatic fissure from above. The right vesicle shows the vascular pole (superior external border) (the only non-enucleative portion). Here, at X, the vessels concentrate to the vesicle and to the ureter, producing immobilization between these points. The left vesicle is pathologic; is enclosed in an inflammatory capsule; is innucleable, and has nothing to do with this illustration.

It is the writer's opinion that this concentric vascular zone accounted for his finding one out of three subjects with one or the other, or both ureters stenosed.[1] The block was so pronounced in some cases that the dilatation of the proximal end of the ureter was readily seen going toward the kidney, in contradistinction to the stenosed, or normal, distal end toward the bladder.

With a pathological vesicle present, a stone would meet with especial resistance in passing this portion of the ureter.

It also accounts for the kinking of the ureter in extensive eccentric dilatation of the bladder (Fig. 5) whereby the pushing away of the vesicle will pull the ureter into a kink upon itself. This closure of lumen of the ureter necessarily produces hydro-ureter and hydronephrosis.

Ejaculatory duct and utriculus masculinus.— The delicacy of these ducts dipping into the scinus pocularis easily explains how they might be blocked by inflammatory detritus. The prostatic fissure through which they pass (Fig. 2) makes a certain way, if followed, for the operator to finally find the seminal vesicles after passing through the prostate under the bladder. It is easy of penetration when operating from above and would afford a channel for drainage when the perineum was punctured or even out through the urethra.

The fallacy of medication possibilities through the scinus pocularis and ejaculatory ducts into the vesicles, can be easily understood when you look at the smallness of the lumen and delicacy of the ducts in Fig. 6, and the complete destruction of duct comformation in Fig. 7.

Inner structure of the vesicula.— The innumerable blind pouches that compose the mucous lined interior of the vesicle (which to

Fig. 5. Shows a distortion of the vesicle whereby the vesicle and vas ampulla are lifted up from the ejaculatory duct end and pulled upward and inward, pulling upon the superior external border (vascular pole), demonstrating the connection of the vesicle in this region with the ureter. The ureter should be anterior to the vesicle, and this unnatural picture is merely made to illustrate the point more lucidly.

[1] A pathological vesicle was always found present in these cases.

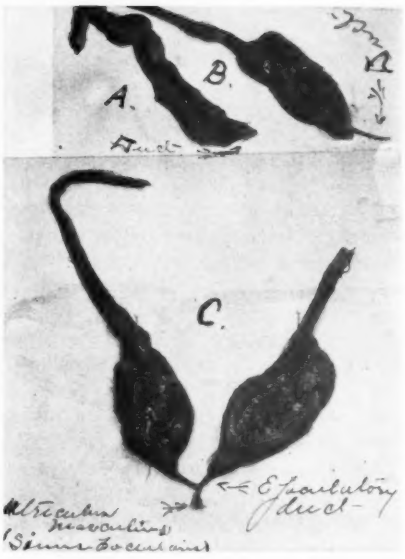


Fig. 6. Shows the delicacy of the ejaculatory ducts of the vesicles A and B. C shows the vesicles and vasa ampullæ with the perivesicular fascia intact. The ejaculatory ducts are plainly seen emptying into the utriculus masculinis (sinus pocularis).

Fig. 7. Shows five vesiculæ, two of them fused together somewhat horse-shoe shaped. Their ducts are entirely obliterated by inflammatory metamorphosis.

a certain extent is duplicated by the vas ampulla) are a misfortune to mankind on account of their easy adaptability to become retention cysts following inflammatory interference, affording no chance for drainage on account of duct block and duct obliteration.

WAYS OF ATTACK FOR THE REMOVAL OF THE SEMINAL VESICLES

Intraperitoneal.— Patient in Trendelenberg posture. Rectovesical fold of peritoneum brought up and incised. Vesicles found just beneath.

Extraperitoneal.— Midline dissection of peritoneum away from bladder. Vas deferens leads you to vesicle.

Perineal.— Prostate divided through the prostatic fissure; ejaculatory ducts and vasa ampullæ lead to vesiculæ or prostate pulled forward, by preferably Zuckerkandl screw, vesicular fascia dissected loose from posterior border and vesicle found just within.

It is not the object of this study of the seminal vesicles to stimulate any one to hazard the life of any patient by undertaking an operation which might seem easy of accomplishment, for that is not true. But it seems to the writer that the day is coming when vesiculectomy will be demanded to a greater extent than it is to-day, and in order to prepare for that time research work to-day in that region becomes a necessity.

THE USE OF OIL IN ABDOMINAL SURGERY[1]

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DURING the past twenty years the use of oil in the peritoneal cavity has on several occasions been recommended by various writers, who have brought forward different indications for its employment. Thus in the numerous records of experiments carried out with a view to finding some agent which would prevent the formation of post-operative adhesions, sterile oil is almost invariably mentioned as one of the agents tried. The intraperitoneal use of oil has also been advocated for cases of peritonitis with the object of delaying the absorption of bacteria from the peritoneal cavity. The use of this agent has not, however, received much favor among the profession generally, probably because surgeons are loath to introduce into the peritoneal cavity any foreign substance concerning the fate of which they are uncertain. Accordingly one must first ascertain whether or not there be any danger associated with the introduction of oil into the abdomen before advocating its use in abdominal surgery. The dangers which suggest themselves are oil embolism, peritoneal irritation by this foreign substance, and sepsis. With regard to oil embolism it may be at once stated that no observer has ever recorded any evidence that it does occur, at any rate in a degree sufficient to cause harm. Personally in some thirty experiments one has always carefully examined post-mortem for any evidence of this complication, but one has never detected any lesion indicating its presence.

Concerning the question of irritation or infection of the peritoneum by the oil different opinions have been expressed. Thus, Stern (1) found considerable inflammatory reaction in the peritoneal cavity of rabbits after the introduction of presumably sterile olive oil. Blake (2) on the other hand saw no evidence of peritoneal irritation after the introduction of large quantities of sterile oil into the peritoneal cavity in cats. The difficulty here consists in the fact that in order to sterilize any ordinary oil, such as olive oil, one must expose it to a temperature which causes the separation of some free fatty acid, which is undoubtedly irritative. In the first series of experiments the writer employed the purest sterile olive oil, but found that it caused considerable peritoneal irritation. After unsuccessfully trying to obtain a purely animal oil, he, at the suggestion of Mr. Alexander, chemist to the Edinburgh Royal Infirmary, tried *sterile vaseline oil*, and after extensive use of this agent, is quite satisfied that it is the best for the purpose. It is the oily liquid which comes to the surface in the preparation of vaseline, it is really a liquid paraffin, is absolutely neutral, and remains unchanged after prolonged exposure to steam under high pressure. One can confidently recommend the use of this agent in the peritoneal cavity in suitable cases as being absolutely free from danger.

THE USE OF STERILE OIL IN THE TREATMENT OF PERITONEAL ADHESIONS

The formation of adhesions after abdominal operations is a subject which has received the attention of surgeons ever since the advent of the era of abdominal surgery. The question of the prevention of such adhesions naturally has been studied most carefully, and very numerous methods have been devised with this purpose. At the present day our knowledge of the subject stands somewhat as follows: After an aseptic abdominal operation carried out without undue or rough handling of the viscera adhesions are unlikely to occur. Simple abrasion of the peritoneal surface of the viscera without infection may, but seldom does, lead to permanent adhesions. Infection of the peritoneal cavity may clear up and leave no permanent adhesions. Rough handling and abrasion of peritoneal surfaces in infected cases generally lead to the formation of adhesions, which may be permanent. In

[1] From the Laboratory of the Royal College of Physicians, Edinburgh.

several experiments on cats the writer has found that serious abrasions of considerable peritoneal surfaces may in some cases be produced without the subsequent formation of any lasting adhesions, provided no infection of the peritoneum is permitted. Even where infection was lacking, however, some degree of adhesion of the denuded surfaces was the rule.

In the human subject idiosyncrasy would seem to play a large part in determining the formation of adhesions, and an operation which in one person would cause very little peritoneal disturbance, in another gives rise to extensive adhesions, the treatment of which is notoriously unsatisfactory.

After an ordinary aseptic abdominal operation, however, there is little justification for the routine practice of introducing some foreign substance such as oil into the peritoneal cavity with a view to preventing adhesions. More practical interest centers in the question regarding what is to be done for the patient who presents himself for treatment with symptoms referable to peritoneal adhesions. Laparotomy and separation of the adhesions with the burying of raw surfaces as far as that is possible, gives as a rule only temporary relief. The introduction of foreign substances between the rawed surfaces has frequently been tried. Stern experimented with sterile vaseline, olive oil, and collodion, but found none of them to be of real value. Duschinsky (3) tried the insertion of pieces of gold beaters' skin, and Lauenstein (4) experimented with silk protective, but neither proved to be of practical value. Vogel (5) obtained some success with a mucilage of gum arabic. Busch and Bibergeil (6) in an elaborate research tested olive oil, gum arabic, paraffin, lanoline, gelatine, coragen, agar, and fibrolysin, but found none of them of any great value. They used oil in only one experiment, however, so that with regard to it their conclusions do not carry much weight. More recently Blake has recorded in this journal his experience in the use of oil in the abdomen, and is of the opinion that it does tend to prevent the formation of adhesions. Gellhorn experimented with sterilized lanoline and found that this prevented adhesions to some extent.

Numerous writers recommend pouring a saline solution into the abdomen at the conclusion of an operation as a preventive measure against adhesions, but the rapidity of absorption of this fluid makes its use of questionable value.

Relative to this part of the subject the writer has carried out six experiments on cats and rabbits. The procedure was as follows: The animal's abdomen was opened with aseptic precaution, the surface of the small intestine over about sixteen inches of its length, was scrubbed with dry gauze and scraped with a knife till bleeding points appeared. Six weeks or two months later the abdomens of the twelve animals so treated were reopened and in all adhesions were present, though they were never very extensive. These adhesions were broken down leaving raw surfaces. In six of the animals oil was then smeared over the rawed surfaces and the abdomen closed. In the control animals the adhesions were broken down but no oil used. The animals were opened again four weeks later, and it was found that in those in which oil had been used, the adhesions were very much fewer and less dense than in the controls. At the end of a month all trace of oil had disappeared from the peritoneal cavity. One has found fifteen days to be the longest time for oil to remain in macroscopic quantity in the peritoneal cavity in aseptic cases.

One concluded, therefore, that sterile oil may be advantageously used for mopping over denuded surfaces in operations for peritoneal adhesions.

THE USE OF OIL IN CASES OF ACUTE PERITONITIS TO DELAY ABSORPTION OF BACTERIA

An enormous capacity for absorption has long been recognized as a striking characteristic of the peritoneum. One need not recapitulate the results of the work done in this connection, but need only mention that as the result of researches by Wegner (7), Starling and Tubby (8), Meltzer (9), Mendel (10), Klapp (11), Orlow (12), Heidenhain (13), Durham (14), McCallum (15), Buxton and Torrey (16), and Peiser (17), we have now fairly accurate knowledge as to the process of absorption from the normal peritoneal cavity. We know that fluids and soluble substances

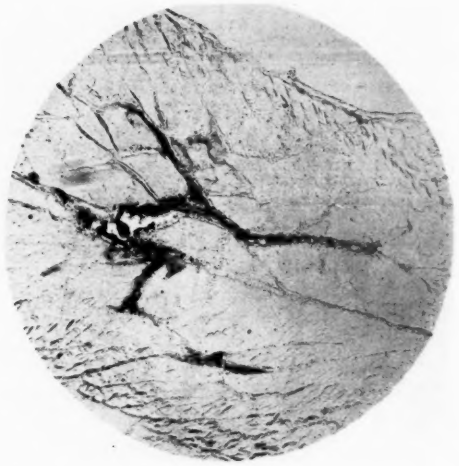

Fig. 1. Section of rabbit's diaphragm seven weeks after injecting oil and staphylococci into its peritoneal cavity. Note oil in phrenic lymphatics. (Sudan III.)

are absorbed in great part by the blood stream, whilst solid particles, including bacteria and such things as oil globules are absorbed by the lymphatic. We know, moreover, that the lymphatic absorption is most active on the under surface of the diaphragm and in the omentum and is very sluggish in the pelvis. Regarding the influence of peritonitis on the absorption from the peritoneal cavity, widely different results have been recorded by different observers. Schnitzler and Ewald (18) found that the absorption of potassium iodide from the peritoneal cavity was delayed in peritonitis. Clairmont and Haberer (19) found that absorption was accelerated by peritonitis, except in the very late stages of the malady, when it was slightly retarded. Glimm (20) in an elaborate research found that absorption of lactose was invariably accelerated during peritonitis, and his results appear to be of greatest value. We may take it, therefore, that the absorption of fluids and of soluble substances is increased during peritonitis.

Peiser (21) investigated the absorption of bacteria from the peritoneal cavity into the blood stream during peritonitis. He found, during the first few hours of a peritonitis, great numbers of bacteria in the blood stream, but during the course of the peritonitis as the number of bacteria increased in the peritoneal effusion, the number in the blood stream diminished, owing, he thought, to the lymphatics of the diaphragm becoming mechanically plugged by bacteria. The fibrous exudate coating the diaphragm must, however, also play a large part in retarding the absorption of bacteria.

The question now arises as to *which is the more favorable for the patient suffering from peritonitis, rapid or slow absorption?* Many writers, most prominent among whom was Lennander (22), considered that absorption of bacteria into the blood stream, by stimulating the production of antibodies, was a protective and beneficial occurrence. More recent work, however, has shown that this is not the case, and that on the contrary the more localized the infection can be kept the greater the chance for the patient. Peiser found that a certain dose of B. Coli. could be injected with impunity into the peritoneal cavity of a rabbit. The same dose could be injected into the blood

Fig. 2. Acute obstruction due to recent adhesions. Note great distention of stomach and jejunum and the collapsed ileum lying to the right of stomach. A, position of the adhesion causing obstruction.

stream of a rabbit without producing death. If, however, one half of this dose was injected into the peritoneal cavity, and an hour later the other half was injected into the blood stream, the rabbit died within a few hours with all the signs of an acute peritonitis. It would appear therefore, that as Peiser says, "Recovery from peritonitis depends on the fight between the bacteria and the body defenses being confined to the peritoneal cavity."

DOES THE INTRAPERITONEAL ADMINISTRATION OF OIL RETARD BACTERIAL ABSORPTION IN PERITONITIS?

Glimm investigated this point and as the result of his experiments concluded that the administration of oil greatly retarded bacterial absorption and favored recovery from peritonitis. He, however, injected the oil some hours before inducing the peritonitis, and as Buxton and Torrey (23) have shown, Glimm's good results were mainly due to the reactive changes set up in the peritoneum by the preliminary introduction of the oil. The writer carried out a series of twelve experiments to test the value of oil as a life saving agent when it is given at the same time as or shortly after the peritonitis is induced, this being obviously the question of most practical import.

The results of these experiments are given in tabular form below. These experiments were carried out on rabbits. The bacterium employed was staplylococcus aureus, the latter because, as the writer has elsewhere shown,[1] it induces in rabbits a purulent plastic type of peritonitis closely resembling that found in the human subject.

The purest sterile clive oil was employed, and except where otherwise noted, it was injected immediately before the introduction of the bacteria. The record of these experiments is given in tabular form (see Table 1).

From these experiments it is clear that the presence of oil in the peritoneal cavity of a rabbit with a generalized peritonitis *with no adhesions*, does not have any noteworthy beneficial action as regards the saving of life.

At the same time the results in experiments 2 and 8, seemed to indicate that the oil may have some influence in averting early death

[1] Jour. of Path. and Bact., October, 1900.

TABLE I

	Animal Used	Oil Injected	Bacteria Injected	Result
Exp. 1.	Rabbit 1.	2.5 cc. oil.	200 million St. Aur.	Recovery.
	Rabbit 2, control.	None.	200 million St. Aur.	Death 3 weeks later.
Exp. 2.	Rabbit 1.	3.5 cc. oil.	4,000 million St. Aur.	Death 7 weeks later.
	Rabbit 2, control.	None.	4,000 million St. Aur.	Death 16 hours after.
Exp. 3.	Rabbit 1.	3 cc. oil.	4,000 million St. Aur.	Death 14 hours after.
	Rabbit 2, control.	None.	4,000 million St. Aur.	Death 15 hours after.
Exp. 4.	Rabbit 1.	2 cc. oil.	3,000 million St. Aur.	Death 48 hours later.
	Rabbit 2, control.	None.	3,000 million St. Aur.	Death 48¼ hours later.
Exp. 5.	Rabbit 1.	4 cc. oil.	2,500 million St. Aur.	Recovery.
	Rabbit 2, control.	None.	2,500 million St. Aur.	Recovery.
Exp. 6.	Rabbit 1.	4 cc. oil.	3,500 million St. Aur.	Death 23 hours after.
	Rabbit 2, control.	None.	3,500 million St. Aur.	Death 22¼ hours after.
Exp. 7.	Rabbit 1.	5 cc. oil.	3,000 million St. Aur.	Death 54 hours after.
	Rabbit 2, control.	None.	3,000 million St. Aur.	Death 33 hours after.
Exp. 8.	Rabbit 1.	4 cc. oil.	4,500 million St. Aur.	Recovery but emaciat'd
	Rabbit 2, control.	None.	4,500 million St. Aur.	Death 13 hours after.
Exp. 9.	Rabbit 1.	4.5 cc. oil.	1,000 million St. Aur.	Death 9 hours later.
	Rabbit 2, control.	None.	1,000 million St. Aur.	Death 13 hours later.
Exp. 10.	Rabbit 1.	4 cc. oil.	1,500 million St. Aur.	Death 17 hours later.
	Rabbit 2, control.	None.	1,500 million St. Aur.	Death 16¼ hours later.
Exp. 11.	Rabbit 1.	5 cc. oil 3 hrs. after.	1,000 million St. Aur.	Death 2 weeks later.
	Rabbit 2, control.	None.	1,000 million St. Aur.	Recovery.
Exp. 12.	Rabbit 1.	3 cc. oil 2¼ hrs. after.	2,500 million St. Aur.	Death within 15 hrs.
	Rabbit 2, control.	None.	2,500 million St. Aur.	Death within 15 hrs.

from rapid absorption, and in localizing the infection to the peritoneal cavity, and might possibly be used with advantage in e. g., fulminating cases of appendicitis.

The next question requiring solution is, *Does the presence of oil in the peritoneal effusion interfere in any way with the cellular reaction in that effusion, and does it in non-fatal cases delay the process of recovery?* By making films at intervals of a few hours from the peritoneal effusion in two rabbits with peritonitis, to one of which oil had been given, one was able to note the cellular changes. It was found that the cellular reaction was not interfered with by the oil and that the return to normal was only slightly delayed. There were one or two exceptions however (Exper. 2, 8, and 11) where the animals got over the initial danger but then gradually emaciated and in which at the end of two or more weeks on opening the abdomen, one found a cake of "cream cheese like" material which on examination was found to consist of fibrin, degenerated leucocytes, oil globules and bacteria. One cannot therefore agree with Glimm that the presence of oil never impedes but rather hastens the return to normal

in the peritoneal cavity. That the oil may, and generally does, remain for long periods in the phrenic lymphatics was made evident by microscopic sections of the diaphragms of rabbits at various intervals after the injection of the oil. In one case oil globules were still present in the phrenic lymphatics seven weeks (see Fig. 1) in another ten and a half weeks after the intraperitoneal injection.

Cultures were made from the heart blood of all the fatal cases in the above experiments, and it was interesting to find that whereas a growth of staphylococcus was obtained on five occasions from the blood of the control animals which got no oil, on only one occasion was a similar growth got from the blood of the animals which had received an injection of oil. As the death rate among the latter animals was almost as high as among the former ones, this is but another proof that the fatal issue in cases of peritonitis is due to toxæmia and not to septicæmia, and it would appear to upset somewhat the rationale of this method of treatment.

THE USE OF OIL TO PREVENT OBSTRUCTION FROM RECENT PLASTIC ADHESIONS IN CASES OF ACUTE PERITONITIS

In many fatal cases of peritonitis, more especially those due to appendicitis, a common post-mortem finding is great distention of the small intestine, particularly of the jejunum. This is generally regarded as being the result of a toxic paresis of the bowel and that the toxic factor plays a large part in the etiology of such cases is undoubted. In many cases, however, the writer is convinced that a definite obstructive cause is present, and that this cause is the binding together by recent plastic adhesions of some of the coils of small intestine and usually of the coils of the ileum to each other, to the cæcum, or to some abraded area of the parietal peritoneum. At the upper limit of the adhesion some difficulty is offered to onward peristalsis, distention of the immediately proximal loop occurs and a kink forms.

One has had the opportunity during the past year to observe the course of five such cases. In all of these an operation was performed for peritonitis following appendicitis, and in each case the patient died some days later with vomiting and great abdominal distention. At the post-mortem great distention of the jejunum and upper part of the ileum was found, whilst the lower coils of ileum were collapsed and empty and between these two segments, some coils of ileum were found, bound by recent adhesions to each other, to the cæcum or to the pelvic wall. In such cases were the distention of a paralytic nature it would affect the entire small intestine and not only the upper part, leaving the lower part collapsed. Moreover if an enterostomy be made, in a distended loop in such a case, sufficiently early, it is not uncommon to see active peristalsis in the distended bowel, suggesting a distal obstruction and not a paresis or paralysis of the entire gut.

That a recent plastic adhesion is sufficient to cause definite intestinal obstruction one has succeeded in proving experimentally, and though the peristaltic power of the normal intestine would probably overcome such an obstruction, that of a bowel weakened by toxæmia is frequently inadequate. A minimum of handling of inflamed bowel at operations for peritonitis is now a generally recognized maxim, but when such handling must be practiced, as it sometimes must, the mopping of such handled surfaces with sterile oil in order to prevent subsequent adhesion, is a procedure which I believe is more than justified by the results of the experiments described below.

The two factors which one wished to introduce into these experiments were, firstly, abrasion of the peritoneum, and secondly, bacterial infection, the latter being of a mild nature and not of itself sufficient to endanger the animal's life. The procedure was as follows: Under ether anæsthesia the abdomen of a rabbit was opened, its appendix was amputated, and the stump invaginated. The cæcum and some inches of the ileum were scrubbed with a piece of dry, sterile gauze to produce an abrasion of the peritoneal coat. One or two loopfuls of an emulsion of staphylococcus aureus (from one-fiftieth to one-twentieth of the lethal intraperitoneal dose) were then introduced into the peritoneal cavity and the abdomen was closed. The same procedure was carried out on a second rabbit with this addition, that before closing the abdomen some sterile vaseline oil was poured over the intestines.

EXPERIMENT 1

Rabbit 1. Ether anæsthesia, abdomen opened, appendix amputated, cæcum and 12 inches of ileum scrubbed with dry sterile gauze. One-fiftieth of lethal dose of staphylococcus aureus suspended in saline injected into the abdomen, wound closed. The following day the animal was very dull and would not eat and it was found dead on the morning of the second day following operation.

Post-mortem. Great abdominal distention. On opening the abdomen enormously distended coils of jejunum presented. The stomach greatly distended. Cæcum and lower part of ileum collapsed and empty. On tracing the distended bowel downwards one found that it had adhered to the cæcum at one point. Here it had kinked on itself and led to complete intestinal obstruction. The adhesion was quite recent and broke down with the slightest traction. There was little free fluid in the abdomen and death was obviously due to obstruction and not to infective peritonitis.

Rabbit 2. Ether anæsthesia. Abdomen opened, appendix amputated. Cæcum and twelve inches of ileum scrubbed with dry gauze. One-fiftieth part of a lethal dose of staphylococcus aureus suspended in saline injected into peritoneal cavity. *Four cc. of sterile vaseline oil poured over the intestinal coils,* abdomen closed. The animal appeared well on the following day and made a perfect recovery. A week later under ether anæsthesia the abdomen was reopened. Free oil was still visible forming a thin film over the intestines and there were no adhesions, abdomen closed. Six weeks later the abdomen was opened a third time. No oil could now be seen and there were a few adhesions between the ileum and the cæcum.

EXPERIMENT 2

Rabbit 1. Ether anæsthesia, abdomen opened, appendix amputated, stump invaginated. Cæcum scrubbed with dry gauze till peritoneal coat roughened. Sixteen inches of the ileum similarly treated. One-twentieth part of a lethal intraperitoneal dose of staphylococcus aureus suspended in saline injected over the intestines; abdomen closed. The rabbit was very dull and would not eat on the following day and it died 44 hours after operation with a greatly distended abdomen.

Post-mortem. Great tumidity of the abdomen. On opening the peritoneal cavity a distended stomach and greatly distended coils of jejunum presented. Tracing the distended bowel downwards one came to a point where the small intestine had adhered to the cæcum. Here a kink was found to have occurred, several loops of intestine below this had also adhered to the cæcum, and the lower part of the ileum was collapsed and empty. The large intestine was more or less collapsed. There was practically no free fluid in the abdomen and but a mild degree of peritoneal inflammation. Death was obviously due to obstruction. (See Fig. 2.)

Rabbit 2. Ether anæsthesia; abdomen opened; appendix amputated, stump invaginated. The cæcum and sixteen inches of small intestine scrubbed with dry gauze and then one-twentieth part of the lethal dose of staphylococcus aureus in saline injected over the intestine. *Before closing the abdomen 5 cc. of sterile vaseline oil was poured over the intestines.*

The rabbit never appeared ill and made a prompt and complete recovery. Eighteen days later its abdomen was reopened. There were numerous adhesions of recent date. (From the ease with which they were broken down probably the adhesions were of not more than five or six days' duration.)

No trace of oil in the abdominal cavity. Three other similar experiments were carried out. In one of these both rabbits made prompt recoveries. In the other two, the rabbits which got no oil were ill for two days, but recovered, whilst those which got oil never showed any signs of abdominal trouble.

Another case of death from obstruction due to a recent adhesion occurred in a rabbit, 4 days after infection of the peritoneum, without the mechanical abrasion of the peritoneum practiced in the experiments mentioned above. From these results two facts are quite clear: Firstly, that recent plastic adhesions (even of 36 hours' duration) are capable of causing complete intestinal obstruction, and secondly, that the use of sterile oil applied over abraded peritoneal surfaces in cases of abdominal infections is of great value in preventing obstruction from recent adhesions.

There is yet another question which still awaits an answer, and that is, whether when definite obstructive symptoms appear after an operation for, say acute appendicitis, it would be advisable to freely open the abdomen, break down the adhesions and cover the separated surfaces with some oily substance to prevent further adhesion. Whether the separation of adherent surfaces, by exposing abraded areas and thus hastening the absorption of toxins, would do more harm than the obstruction was previously causing, is a question which experience alone will decide. In any case mere opening and draining the distended gut, though always doing good, seldom avails to save the patient's life in this desperate class of case.

THE USE OF OIL TO FAVOR DRAINAGE AND INTESTINAL PERISTALSIS IN CASES OF GENERALIZED PERITONITIS

When one examines the abdomen of a patient who has died, say two days after an operation for generalized peritonitis, one realizes how the property which the peritoneum pos-

sesses of forming plastic adhesions and which is so valuable in localizing infections, may when the infection becomes generalized, militate against the patient's chances of recovery. One finds in such a case that whereas at the operation, two days before, the intestines were floating in purulent exudate, at the post-mortem the coils of intestine are glued together and between them are everywhere pockets of pus. When the pus was evacuated at the operation the inflamed peritoneal surfaces came to-together and adhered, and the pelvic or other drains which were left in only drained a small area in their immediate vicinity. This gluing together of the intestinal coils must moreover have considerably interfered with the peristalsis of the bowel wall, weakened as it was by toxæmia. In such cases I believe we have the clearest indication of all for the use of oil in the peritoneal cavity. If at the operation, after the pus is evacuated or the abdomen washed out, oil be poured over the inflamed intestines, adhesions will be prevented, for a few days at least, the purulent exudate will find its way down to the pelvic drain and so escape, and the general lubrication will favor intestinal peristalsis.

Through the kindness of Professor Caird one has had the opportunity of practicing this method of treatment in two cases of absolutely generalized peritonitis. In the one case in which the peritonitis was due to a perforation in a partially gangrenous cæcum which had herniated through the foramen of Winslow, and in which, at the operation, considerable exposure and handling of the intestines was unavoidable, two ounces of sterile vaseline oil was poured into the abdomen at the conclusion of the operation. The patient died 36 hours later and at post-mortem the intestines were found non-adherent and covered with a thin film of oil.

In the second case where an appendix abscess had ruptured into the general peritoneal cavity and where pus and fibrin were found covering the liver and under surface of the diaphragm the same procedure was carried out at the operation. The patient recovered and it was noteworthy that she passed flatus a few hours after operation, and had none of the symptoms of intestinal paresis which one usually sees in such cases.

CONCLUSIONS

From the observations recorded above one feels justified in advocating the introduction of vaseline oil into the peritoneal cavity in the following conditions:

1. In operations for the relief of old-standing adhesions.

2. In operations for localized or diffuse peritonitis where handling of the viscera is unavoidable.

3. In operations for generalized peritonitis to favor subsequent drainage and intestinal peristalsis.

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THE FLOATING HEAD AND ELECTIVE ABDOMINAL DELIVERY

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IN making a prognosis of any given case of labor our eyes should ever be open for the *floating head* and its associated *empty pelvis*. Were clearer views generally held and disseminated regarding the significance of this abnormality, we would hear much less frequently of futile attempts at forceps extraction, ill-judged efforts at version, or of mortally injured or permanently paralyzed babies.

It goes without saying that full appreciation and comprehension of the abnormal can only be *prompt and definite* where clear ideas of the normal exist. It need, therefore, not be considered superfluous to call attention to the following characteristic features of a strictly normal labor. During the last month or six weeks the fœtal ellipse adjusts itself to the uteropelvic axis and the head sinks deeply; near the end of gestation the cervix disappears or becomes canalized, and the advent of labor pains effects rapid dilation. By conjoined examination weeks before, the already engaged head is readily farther depressed. It will be found impossible to approximate the tips of the fingers to the sacral promontory or to pass the hand beneath the head suprapubically. Should the hand easily pass into the pelvis anteriorly and from above, without encountering any definite resistance, we may have a floating head; or the true pelvis may be unoccupied because the pelvic fœtal extremity is in relation with the pelvic canal. It is usually easy to differentiate between the two, but occasionally a mistake will be made.

My object in speaking of the *floating* head as a distinct entity is to enable me to call attention to its significance from the point of view of prognosis. When this is duly appreciated most reliable and positive indications for treatment can be deduced.

Certain dangers attending the course and conduct of labors thus complicated demand especial emphasis, and these threaten both the mother and her child.

With regard to the first point: Where the end of gestation is reached and the head remains above the inlet, we have a most important indication of disproportion, and this is especially true in the primiparous. The existence and the degree of disproportion ought to be made out at the earliest moment, about the thirty-fourth week of gestation.

The influence of the high position of the head is far reaching, and in many of these cases we may look for a very slow first stage; a protracted gestation may be due to the same cause, the influence of the high situation of the head forming a vicious circle. They are likely to go into labor without the usual physiologic development of the lower uterine segment. There is evident a lack of proper development in the non-appearance of the normal canalization of the cervix and the immediately superjacent parts. If these facts be admitted, the utility of certain expedients to overcome disproportion may very properly be questioned. If it can be shown that cervical dilation under certain circumstances is attended by serious danger, such operations as pubiotomy and symphyseotomy must fail for the reason that complete preparation of the canal is a prerequisite.

Bearing on this point I shall briefly refer to three cases of rupture of the uterus under these very conditions. The first of these was in labor with her ninth child, all of the previous labors having been difficult. The dilating stage lasted all night, and had been imperfectly accomplished, when she screamed out in great sudden pain. After this there were no more pains; the woman went into collapse, the presenting head disappeared, the child floating free in the abdominal cavity. The patient died undelivered about two hours after the accident.

The second case was one in which delivery had failed after forceps and version in the hands of two capable physicians. I was called on to do a craniotomy. The patient on my arrival did not present a particularly bad appearance, and there was no difficulty about the operation, the perforated head being extracted by the Braun cranioclast without any undue effort. Immediately following the delivery the patient

went into collapse; there was marked air-hunger and death followed very promptly. I suspected rupture of the uterus, and confirmed my suspicion by passing my hand through a laceration posteriorly. She was a primipara.

The third case occurred during the past summer. She, like the preceding woman, was a primipara who had a very slow first stage. The dilation finally advanced to a point at which it was deemed advisable to use forceps. There was a history of instruments slipping, and in evidence of this there was such extensive laceration of the perineum and rectovaginal septum that packing was resorted to in order to control hæmorrhage. At this time the head was still floating, proved on my arrival by slipping one hand beneath it between the head and the pubic bone. The patient under moderate anæsthesia, my assistant firmly held the head at the brim while I adjusted the blades as near as possible to the sides of the head, and as I made traction he exerted forcible pressure in the axis of the inlet. Without any undue effort we were able to deliver a nine pound girl, which lived and which has done well, being exclusively bottle fed. I was about to leave when the attending physician called my attention to a loop of small bowel protruding from the vagina. It had come into view as he was attempting to expel the placenta. She was washed off, padded, and hurried to hospital by ambulance. Here the placental stage was completed and then her abdomen was opened. While in the Trendelenburg posture all bowel was carefully drawn up out of the pelvis from behind the uterus and inspected. Some ecchymotic spots in the mesentery near the bowel attachment were the only injury that could be found. The rupture of the uterus was not definitely located. Her perineal lesion was cured by subcutaneous repair at the end of three weeks, when the wound had become quite clean, and the woman left the hospital at the end of five weeks, well on the way to recovery.

In many of these cases of non-descent from slight narrowing, and especially where the contraction is of the anteroposterior diameter only, I do version with much satisfaction. I have never had any accident, and during later years I have good results so far as the delivery of living babies is concerned.

But the adoption of version is conditioned on the existence of a slight degree of disproportion. This is difficult to express in figures, if not impossible, and it must be decided by the judgment of the operator in each individual case. I find myself in accord with Williams, who says (Obstetrics, p. 399, 2d Ed.): "The head floating above the superior strait, delivery is best effected by podalic version, provided no serious disproportion exists." Also: "Forceps on the floating head is a most serious procedure, rarely to be undertaken." (The first portion of this teaching I find contradicted in an earlier part of the volume quoted.) More of this later.

Having established the existence of serious disproportion, if necessary under ether, what shall be done? If we wait a sufficient length of time a certain proportion of these cases will so mould the head that it will find its way into the pelvic excavation, where it may be safely within the reach of forceps. It is in advocacy of this, the expectant plan, that I find the contradiction just spoken of. This is always a slow process, frequently requiring several days; as we have seen, it means a certain risk of rupture of the uterus. There is a mortality and a definite morbidity depending on the circumstances attendant on the given case, infection being certain under the influence of frequent internal examination. Every one who has done consultation work can bring his quota of cases with bad results. I have just seen the mother of two babies delivered dead under these circumstances; following her second delivery she was one year in convalescing. It required all this time, with electricity and massage, to restore her health.

If figures are required, a most interesting array has been furnished by J. D. Voorhees in the Am. Journal of Obstetrics for August, 1905. See also article by De Lee (Pract. Med. Series: Obstetrics for 1906, p. 180):

If disproportion be recognized as early as the thirty-fourth week an opportunity will be allowed to consider induction of labor, and I am of the view that a small percentage of cases is quite suitable for this operation. Here as

in so many other situations obstetric, every case must be a law unto itself. In the case reported by my friend, Dr. Astley, I was in full accord with him in not considering it, and in favoring abdominal delivery as the operation of election. He could report a number of cases in which the results of induced labor proved keenly disappointing. The mothers made a uniformly good convalescence, but fœtal mortality was about one hundred per cent.

I am also willing to admit that symphyseotomy or pubiotomy may be successfully employed, but I am firmly of the opinion that the field here ought to be limited, and for the reasons already given.

There remains therefore to be considered abdominal delivery as the operation of choice in the cases which present such a degree of disproportion as is beyond the reach of prophylactic version or of expectancy and forceps. I have purposely refrained from giving the figures, the precise measurements of the pelvis that indicate this or that operation. I believe dependence on pelvimetry alone is a method calculated to lead to delusive and erroneous conclusions. I have not gone into its details, in order that I might focus attention on the head. In a given case the results that may be gained by an accurate fitting of the head to the pelvis exceed in value those of all other methods combined.

Clearly in the past we have paid too little attention to the childless mothers; we have underestimated the possibilities and the probabilities of idiocy and the paretic conditions incident to mechanical difficulties at birth; we have constantly turned a deaf ear to the wails of many women during parturition complicated by disproportion between the head and the pelvic canal.

Why should obstetrics lag behind the other special branches of surgery? The time was when gall-stone disease, appendicitis, and many affections now recognized as essentially surgical, were treated by methods purely medical. And quite a few of the cases so treated got entirely well. The argument for expectancy where the head floats because of disproportion is precisely on the same basis. From sixty to seventy-five or eighty per cent of the babies survive the dangers, and only a few mothers actually die.

We want the man in general practice to view these cases from our standpoint, which is diametrically opposed to his in this respect. Knowing that the great majority of cases will deliver themselves normally, he accepts the exceptional case on faith, trusting that somehow all will end well. The obstetric surgeon on the other hand approaches every case as a possible subject of complication, keenly alive to every danger threatening either mother or child. If he would obviate these dangers and approach somewhere near his ideal, he will choose the abdominal route of delivery with increasing frequency.

In the recent past I have done three purely elective Cæsarean sections, saving all the babies and all the mothers. My entire list includes two others besides these, neither of which was elective. In one the pelvis was obstructed by an immovable fibroid, and the woman had been in ineffectual labor for many hours; both she and the baby lived. This was a case in the practice of the late Dr. Frank Swartzlander of Doylestown, occurring about nineteen years ago. The other one was a greatly delayed obstructed labor in the practice of a very old Philadelphian, who enjoyed quite a large obstetric practice in his day, but who had never used forceps or done a single obstetric operation more serious than tying the umbilical cord. Her labor had been delayed many hours, the head being jammed at the superior strait. I attempted to deliver instrumentally, but broke the forceps in the second traction effort. Most of the blade remained in the uterus and beyond the reach of my fingers. I was unwilling to proceed with delivery by the pelvic route, hurriedly secured the assistance of two friends in the vicinity, did a section, extracting a living baby. It lived and did well, but the woman died of peritonitis at the end of forty hours.

The net results of my cases are all of the five babies saved, and four of the five mothers.

In conclusion, whenever a "floating head" persists until the advent of labor, difficulty, delay, and danger are to be feared, especially in the primiparous. Attempts to deliver by

forceps are very likely to be unsuccessful, and they are frequently followed by the most serious consequences. Version, where slight disproportion exists, may be successful; likewise expectancy, delay, and then forceps; but in many of these cases the future welfare of mother and child will be best conserved by electing delivery by the abdominal route.

INTUSSUSCEPTION IN CHILDREN[1]

By J. M. ELDER, M. D., Montreal, Canada

WHEN I was honored by the invitation of your association to read a paper at this meeting, I cast about for some subject which would be possibly of equal interest to the general practitioner and to the surgeon. The subject of intussusception in children had been forced upon my attention by a series of cases at my clinic at the Montreal General Hospital, so I have chosen this subject for my remarks to-day as one meeting the indications I have just mentioned. I have no hope that I shall say anything startlingly new, but by drawing attention to certain facts, figures, and opinions, I trust I may stimulate discussion by the members in general.

Cheyne and Burghard[2] make the statement that "acute intestinal obstruction in infants, if external hernia be excluded, is practically always due to intussusception." The statistics of other observers bear out this, at first sight, rather dogmatic statement; moreover, the onset of this condition is often insidious, and the results of treatment are so vitiated by any delay in arriving at a correct diagnosis that it is of the utmost importance to all concerned that no symptoms should be neglected and no method of arriving at a speedy conclusion in regard to the condition present should be overlooked by the general practitioner, who naturally sees the initiation of a majority of these cases. Osler says, "It is of all forms of intestinal obstruction the one most readily diagnosed." The experience of hospital surgeons, who so frequently see neglected cases sent in by general practitioners, runs somewhat counter to this statement of the master.

[2] Cheyne and Burghard's Surgery, vol. vi.

ETIOLOGY

As regards the etiology of the affection, it would seem to be due to a localized paresis of some parts of the intestinal tract, associated with increased peristalsis in a neighboring part. This unequal peristalsis is a notable feature of many abdominal affections in infants, and hence the proneness of these patients to intussusception. For this reason we find it often associated with diarrhœas and intestinal indigestion, especially in weak, ill-nourished infants. Jumping the child up and down on the knee has often been credited with causing the trouble, and so has straining at stool in cases of chronic constipation. Four to six months is the most common age and 75 per cent of the cases reported have been males. Observers who have seen cases recur at the time of operation, state that the upper end of the bowel (intersusceptum) is not pushed into the lower, but that the lower (intussuscipiens) creeps up over — "swallows" as Sir Watson Cheyne puts it — the upper. This process (as Nothnagel well points out) is analogous to, and only an exaggeration of, the normal method by which the valvulæ conniventes of the colon reach up and bring down the fæces towards the rectum. Bearing this in mind, one can easily understand how any tumor of the bowel would predispose to its being intussuscepted into the section below. This, too, explains those cases of double intussusception which I shall refer to later (case 2).

VARIETIES OF INTUSSUSCEPTION

(*A*) ANATOMICAL

1. *Ileo-cæcal.* von Bergmann says that 70 per cent of all cases of infantile intussusception are of this variety. Here the ileum is

[1] Read before the Surgical Section of the Ontario Medical Association, Toronto, June, 1909.

invaginated into the cæcum, but *not through the ileo-cæcal valve*, which always remains the apex of the intussusceptum. It follows that part of the invaginated portion will be ileum and part colon, and that at times the valve, with the appendix vermiformis, may even present at the anus, or protrude beyond it as shown in the drawing from life made for me from one of my cases by Dr. F. B. Gurd, my then House Surgeon (Fig. 1). There is always apparently great shortening of the colon in these cases.

2. *Ileo-colic.* Here the ileum actually invaginates itself through the valve and may push on even as far as the rectum, but all the intussusceptum will be ileum and the colon will be of normal length and in normal position, and so will the appendix vermiformis. This variety is rare but I remember seeing such a case in Dr. Shepherd's clinic about 18 years ago.

3. *Colic.* Here one part of the colon telescopes another — usually the descending colon into the sigmoid. This constitutes 18 per cent of all cases, and is, par excellence, the form of intussusception met with in old people, especially if any malignant growth be present as a predisposing cause.

4. *Enteric.* An intussusception of the small bowel into small bowel. This is extremely rare and I have never seen a case.

(*B*) CLINICAL

All intussusceptions are either acute or chronic. There must be, one would think, always an acute stage, and yet the symptoms of it are passed over as an ordinary colic, and if the intussuscipiens dilate sufficiently to allow fæcal contents to pass through the intussusceptum, the symptoms of acute obstruction will disappear, and the condition then becomes chronic. Adhesions rapidly form between the serous surfaces of the invaginated bowel and very shortly it will be impossible to reduce the invagination. But the bowel itself cannot be invaginated without taking the mesentery in with it, and it is this pulling upon the mesenteric nerves which causes most of the pain, and which largely differentiates this form of intestinal obstruction from others. Further, the strangulation of the mesentery interferes with the blood supply of the invaginated bowel, and speedy sloughing with subsequent absorption of septic products results. It is the speedy advent of this septic condition rather than the purely obstructive phenomena which makes intussusception such a fatal accident unless speedily dealt with.

SYMPTOMS

There will usually be a history of sudden onset of rather severe colic in a child who was previously in its usual state of health; the severe pain soon ceases and the baby may appear almost well when seen by the physician. I think shock is always present at the outset but it must be very transient, and at the first visit the condition is often overlooked. Infants are so subject to colicky pains, which are usually evanescent phenomena. After the interval of a few hours, during which the baby is very restless, the pain recurs again, and is generally, now for the first time, associated with vomiting and rectal tenesmus. There may be a couple of quite normal stools (especially in the ileo-cæcal variety — not so likely in the sigmoid) but soon the continuous and distressing tenesmus is associated with the characteristic discharge of bloody mucus from the bowel. The vomiting is usually more the regurgitation of anything given by mouth than the persistent, explosive vomiting of other forms of obstruction, and is rarely fæcal.

DIAGNOSIS

It is all important that this should be made as early as possible. An enema should be at once given, and even if ineffectual it should be repeated, if the symptoms detailed above persist. The child should be stripped and a very thorough examination of the abdomen made. In most cases I would strongly *advise that this be done under light anæsthesia;* the restlessness and sensibility of the child will otherwise often prevent one from palpating the characteristic, movable, sausage-shaped tumor which is pathognomonic of this trouble (case 4). A digital rectal examination should also always be made at the same time, as sometimes a tumor may thus be felt in the pelvis.

Just a word upon the bearing of early diagnosis, and consequent prompt treatment upon

prognosis in this affection. I quote Hirschsprung's statistics as given by Rushmore[1] on this point, for two reasons: First, because of his large experience, and second, because he gets such wonderful results by non-operative methods:

"Mortality of cases treated within 12 hours of onset of disease, 6 per cent; in second 12 hours, 35 per cent; over 24 hours, 54 per cent. In 44 children under one year, 70 per cent recovered, if treated within the first 24 hours of the disease; if longer, only 30 per cent recovered and the younger the infant the more reversed will these figures be."

Our own operative statistics at the General Hospital, Montreal, are to the same effect; early treatment is all important if we are to get good results, and early treatment presupposes an early and correct diagnosis, and hence I again insist that these cases should be most closely examined and carefully *watched until intussusception can be carefully excluded* as a cause of the symptoms present.

TREATMENT

This at once raises the interesting question of spontaneous recovery from the condition. Some authorities maintain that most cases of intussusception right themselves in this way, and that we only see those which fail to do so. Undoubtedly, in some cases which have been left to nature, cures have followed as a result of the invaginated portion sloughing and coming away in the stool. But this never should be relied upon, as leakage at the site of the slough, with resulting fatal peritonitis, is much more likely to occur than a spontaneous cure. Moreover, stricture of the bowel at the site of sloughing is very likely to cause trouble later on. In the main, we may say that the treatment of any given case will fall under two categories: 1. *Non-operative;* 2. *Operative.*

1. *Non-operative* This may be in the form of taxis, massage of the tumor under an anæsthetic, or inflating the bowel by air, or fluid, associated with posture. These should always be tried, but not for long, and no undue force employed. Hirschsprung, whose large expeience makes what he says especially worthy of note, states (loc. cit.) that out of 107 cases (77 boys and 30 girls), varying in age from seven weeks to seven years, laparotomy was rarely required, since taxis under general anæsthesia usually led to a cure. Of course the results were better the sooner the treatment was instituted; but even then his recoveries vary from 65 to 75 per cent. But were they all true cases of intussusception? In spite of such a statement it is true that the result of such reduction by massage is not always good. One never knows what damaged bowel is being reduced nor how complete the reduction is, and some fatal results are recorded after this method. Moreover we are consuming very valuable time, and hence I say this should not be long persisted in, and one should practically in all cases advise operation as soon as diagnosis is made.

2. *Operative.* The abdomen should be opened directly over the tumor, if that is palpable; and a fairly free opening should be made and thus all rough handling of the bowel will be avoided. Inasmuch as young children bear anæsthetic shock badly, it is well to have all the preparation done before the anæsthesia is begun, and to operate quickly. The time consumed at an operation is a very important factor in the prognosis. The intussusception tumor should, if possible, be delivered through the abdominal opening and there dealt with. The intussusceptum should be "milked" out of the intussuscipiens, never pulled out. Here Sir Watson Cheyne's method of having an assistant give simultaneously a high enema of warm olive oil often aids, and the incarcerated bowel is thus delivered with less shock. In the four cases I have lately had I was fortunately able to reduce the bowel in all. The question of the viability of the incarcerated bowel is then determined in the same way as that of a strangulated hernia. If not viable it should be resected and some method of end to end anastomosis done; Maunsell's method is probably the best. But what if it be irreducible — so firmly adherent that it will not come away? Then I think Barker's method of treatment is best. He sutures the bowel with the Lembert stitch at the junction of intussusceptum into intussuscipiens, then opens the intussuscipiens and excises the portion of

[1] Rushmore, Annals of Surgery, August, 1907.

incarcerated gut, subsequently ligating its mesentery at the first suture line. If the patient's condition does not admit of this, excise the dead portion and bring out the two ends in the incision and close them later, using the Mikulicz clamp if thought best. To prevent recurrence of the intussusception, it is well, before closing the abdomen, to anchor the intussusceptum by a few stitches through its mesentery to the posterior layer of peritoneum, or to fasten it by suture to some neighboring bowel, e. g., ileum to ascending colon, to prevent ileo-cæcal intussusceptions.

After treatment. This is very important. Enemas should be begun early, should be never large, and should be repeated every four hours until effectual, and all food should be withheld by mouth until they prove effectual.

In conclusion, what promise of cure can we hold out in children promptly treated? Rushmore (loc. cit.) gives the following statistics:

1. As regards the *age* of the patient: During the first six months, there is a mortality of 28 per cent; during the second six months 22 per cent; the third six months 18 per cent, and after the third six months, 14 per cent.

2. As regards the *time of operation* after the incidence of the disease, we find the statistics most instructive. If operated upon within twelve hours, the recoveries will average, even in young infants, 80 per cent; after twelve hours these figures will practically be reversed. (Our statistics at the Montreal General Hospital show 75 per cent of recoveries in cases operated upon within twelve hours of the onset of trouble, and 75 per cent in those operated upon after that time.) The older the patient the better will he be able to stand delay, but here, too, it is rare to get recovery after forty-eight hours.

Chronic intussusception in itself is not a serious trouble but is one of the causes of chronic intermittent obstruction and is liable to lead to secondary acute conditions just as a malignant growth would. The treatment is always excision where possible, or a lateral anastomosis to short circuit the trouble.

Synopsis of four cases of intussusception in infants lately treated by the author at the Montreal General Hospital, and which served as the basis of this paper:

CASE 1. Baby S., aged four months; a healthy male child. Onset of illness insidious; baby was restless and did not sleep well on the night of January 22, 1906, and some slight diarrhœal stools were passed. About 3 P. M. next day he had acute colic and began to vomit, vomiting about four or five times in all. Three enemas were given in the afternoon but none were effectual and obstruction appeared complete at 7 P. M. when I saw the case. The child's condition rapidly became worse and distinct rigidity and tenderness could be made out on the left side of the abdomen. Nothing could be made out by digital examination per rectum. I should have operated at this stage, or at least examined under anæsthesia. At 12 o'clock that night enemata were still ineffectual and a sausage-shaped tumor could be felt in the left side of the abdomen, apparently about the splenic flexure, and some bloody mucus was passed with each attack of tenesmus, which was fairly often. The picture was now classical — the baby lay quietly in bed with a "wooden" expression and only at times complaining of cramp-like pains and not vomiting unless something was given it. The breathing was rapid, pulse 120, temperature 101°. It was immediately taken to the hospital and a laparotomy done. The incision was made in the median line and the collapsed sigmoid found; the colon was delivered and an ileo-cæcal intussusception exposed. This had gone as far around as the splenic flexure, into which apparently the ileum ran. It was reduced with some difficulty, the cæcum and appendix coming out last. The appendix was very blue and congested, so was removed, but the rest of the intussusceptum was apparently viable. The bowels were returned and two or three fine catgut sutures introduced between the ileum and cæcum with a view to prevent recurrence of intussusception. The baby was extremely restless all that night, apparently suffering from frequent spasms of very severe pain; it refused all nourishment and the bowels did not move; one-sixteenth of a grain of morphia did not control the pain; there was no vomiting. The bowels later began to move and the baby took the breast. Later on the next evening the child's respirations, pulse, and temperature, went up and he developed symptoms of pneumonia from which he died on the night of the 27th, with abdomen soft and bowels moving freely. Here we waited too long before operating, I think, and the child became toxic and died from septic pneumonia.

CASE 2. Baby P., aged six months, female, referred to me by Dr. Blackader. Not a very strong child, but was in usual health until 2 A. M. November 17, 1907, when it awakened crying and seemed in a good deal of pain during the remainder of the night. A dose of 02. ricini was given and the bowels moved once; no blood in the stools. She was restless and feverish all that day but was not so ill that the mother could not take her out. Next night she was worse, waking frequently and crying out with pain. Towards morning the bowels moved once, no blood in the stools. At 11

A. M. the child became suddenly worse and began vomiting and there now appeared every hour stools of bloody mucus with frequent spasms of pain. The child was admitted to the hospital at 9.30 that evening with a pulse of 120, respirations 50, and a temperature 99½°. On the left side of the abdomen, low down, was a sausage-shaped mass which could also be felt by rectum; the abdomen was distended. The child was resting quietly and operation was performed at once. An incision was made to the left of the left rectus muscle of the abdomen. The mass was delivered and it was found that the intussusception was a double one. Evidently there had been first an ileo-cæcal intussusception, which had progressed along as far as the splenic flexure, and then this whole mass had intussuscepted into the sigmoid flexure of the colon, so that it appeared as if the ileum had been transplanted into the sigmoid. The sigmoid intussusception was first "milked" out and then the ileo-cæcal similarly reduced. The incarcerated bowel after its liberation, though dark in color, was glistening and viable and under hot fomentation it speedily regained color. Two stay sutures of fine silk were placed at the ileo-cæcal angle to prevent recurrence, and the abdomen closed without drainage by through and through sutures to save time — a mistake, I think, as the sequel will show. Time of operation, thirty minutes. Post-operative pain and distress were controlled by enemas of starch containing one drop of tr. opii. Great difficulty was experienced, by enemas, in overcoming the great tympany that followed operation, and for several days it looked as though the child would not recover. Vomiting was associated with the tympany and the heart required constant hypodermic stimulation. The temperature at one time, the day after operation, reached 104½° and pyrexia continued until the sixth day after operation, then it came down to normal and the patient did well. The abdominal distention pulled out some of the sutures and a ventral hernia at the site of operation developed and is still there. This has proved that suturing in layers would have been better.

CASE 3. Baby O., aged four months, male; a small, not well developed child, a seven months' baby and artificially fed. Sent to the hospital on July 29, 1908, by Dr. Church. There was a large prolapse of the bowel, 5 cm. long, from the rectum (Fig. 1). At the end of this prolapsed opening a small opening permitted the passage of fæces at frequent intervals. There was no abdominal distention and no vomiting, though the baby appeared to be in some pain and distress; temperature 98°, pulse 164, respirations 64. This protrusion from the anus appeared suddenly at 9 A. M., without apparent cause or previous history of severe pain or obstructive symptoms. The protruded mass could only be partially reduced en masse, but the slightest strain on the part of the child brought it down again. Laparotomy was performed at 2 P. M. when an intussusception of the sigmoid was found, the intussusception protruding out through the anus. I thought it was probably an ileo-cæcal case and therefore went to the right of the mid line in my incision, but I was wrong, as it proved to be purely a sigmoid case,

Fig. 1. Case 3.

easily reduced by combined external and internal pressure. The obstruction was not complete, as gas and fæces could pass, and the incarcerated bowel was not very dark and quickly regained its normal color under hot cloths. Two fine silk sutures secured the mesentery of the sigmoid to the parietal peritoneum with a view to preventing a recurrence and the abdomen was closed as usual. The operation lasted twenty minutes in all. A rectal saline with brandy was given and the child soon recovered from the shock of the operation. Next day there was marked abdominal distention, but under enemas of turpentine and quin. bisulph., the bowels moved well and flatus disappeared. The child improved rapidly and went home on the third day, returning on the tenth day to have the sutures removed, when primary union was found to have taken place. I have since heard that the child is quite well.

CASE 4. G. C. aged eight years, male. Was at school as usual on December 11, 1908, but complained of slight diarrhœa in the afternoon. Slept well all night but awakened at 6 A. M. with sudden, violent abdominal colic referred to the left side of the abdomen. He vomited a little and was pale and weak and could not lie on the left side. The patient had two or three stools in rapid succession, the character of which was not noticed, as he had used the water closet. Paroxysmal pain continued, with nausea, but no vomiting, and I saw the lad at 11 A. M. He was lying partially dressed on a couch, the countenance was pale and anxious; no coldness or evidence of shock; the pulse was slow and somewhat intermittent, temperature 97°. Examination of the abdomen was then negative as to a mass but there was some tenderness on the left side, with diminished dullness on percussion over left hypochondriac region. Digital examination per rectum was negative. An enema of soapsuds was given and the stool ordered to be kept until my return from my office whither I went for an anæsthetic. I returned shortly, and found that the returned enema contained some bloody mucus and particles of fæcal matter. No flatus passed. Under C. E. anæsthesia, I could easily palpate a sausage-shaped movable mass in the left hypo-

chondrium and at once ordered the patient to the hospital where I operated as soon as I could obtain the consent of the father, who was absent on business.

Operation under C. E. anæsthesia was done in the left semilunar line at the level of the umbilicus and a sausage-shaped tumor of the splenic flexure of the colon delivered through the wound. The other parts of the colon were normal so this was evidently a pure colic intussusception,— the transverse colon into the splenic flexure. The invaginated bowel (five inches long) was easily reduced by pressing up from below ("milking up the tumor"), and the intussuspected portion soon regained good color under hot cloths. The intussuscipiens was markedly œdematous and showed a distinct ring at the point of invagination, simulating stricture. At this point a fine silk suture was tucked into the mesocolon, at both sides of the ring, to prevent a possible recurrence, and the abdomen closed in layers without drainage. The operation lasted twenty-five minutes. Recovery was quite uneventful and he was removed to his home in the ambulance on the fourth day after operation and was up and about in three weeks, the wound healing by primary union.

To recapitulate, four cases, all reducible, with one death from pneumonia on the second day after operation, a mortality of 25 per cent. All were fairly early cases; all were reducible, and in none was resection of the bowel needed. The post-operative hernia I attribute to the tension on the through and through sutures as a result of the great abdominal distention, and hereafter I shall close the abdomen, where possible, in layers.

I have before me the records of four other cases operated upon at the General Hospital during the period covered by the cases I here report. None of these were operated upon within twelve hours of the onset of the disease. In three of the cases resection of the injured bowel was demanded and all three died. In the other case, although operated upon fourteen hours after the incidence of the disease, resection was not needed and recovery took place.

Here we have two series of cases, four in each, operated upon during the same period of time in our Hospital, with practically the same technique and after treatment, and in those operated upon within the first twelve hours no resection of the bowel was needed and 75 per cent recovered; whereas in those operated upon after twelve hours had elapsed, three of the four cases required resection of the bowel, and only 25 per cent recovered.

PREMATURE DETACHMENT OF NORMALLY SITUATED PLACENTA[1]

SYNONYMS: ACCIDENTAL HÆMORRHAGE; ABRUPTIO PLACENTÆ (DE LEE); ABLATIO PLACENTÆ (HOLMES)

BY MARK T. GOLDSTINE, M. D., CHICAGO, ILLINOIS

HÆMORRHAGE occurring before or during the birth of the child is always a dangerous and sometimes a fatal complication, and with the exception of injury to the birth canal, the hæmorrhage from a normally situated placenta is just as frequent as from placenta prævia. Holmes, Edgar, and others believe it is more common than placenta prævia.

Goodell, in 1869, collected 106 cases from the literature. To this Holmes added 200 in 1901, and the latter writer states that these figures do not give a true return of the cases, as a great number have very little hæmorrhage, either internal, external, or combined. They pass unnoticed. Colclough reported 82 cases in 1902, and since 1904, the writer has added 98 additional cases. There is considerable divergence of opinion among many authors as to its frequency, but an analysis of the cases tends to show that it occurs about once in 250 labors.

Etiology. Many theories have been offered as to the primary cause of separation of the placenta, and as yet none are entirely satisfactory. A normal placenta may rarely become detached under certain conditions, but in the great majority of cases, the placenta is

[1] Inaugural thesis presented to the Chicago Gynecological Society, November 10, 1909.

diseased or there is some pathological condition of the patient which affects the placenta, although it may appear normal on macroscopic examination. It is generally believed that renal disease is certainly a factor in causing separation of the placenta. This is sustained by the reports of six cases by Weiss, and two by Veit. Multiparity is a predisposing cause, as are endometritis and metritis. The exciting cause in many instances may be direct violence, such as a kick or blow upon the abdomen or over-exertion and stretching. Shock, fright, severe vomiting, coughing, and straining may be factors in causing separation of the placenta. The pulling of a short umbilical cord on the placenta or a diminution in size of the uterus after rupture of the membranes, especially in premature deliveries and hydramnios, or after the birth of the first child in twins, may be causative. Blood diathesis was the etiological cause in one case (De Lee).

Pathology. When the placenta separates, the vessels of the decidua serotina are torn through and the uterus is unable to check the hæmorrhage owing to the products of conception still being retained and preventing the uterus from contracting and retracting down on the open vessels. Analogous to this is the retention of secundines in the early months of pregnancy. The blood thrown out may be entirely retained in the uterus part may escape, or it may all find its way exteriorly. This gives us the clinical classification as adopted by the German authors of external, mixed, and concealed hæmorrhage in contradistinction to the text-book classification of external and internal or concealed. When it is completely retained, we have a concealed hæmorrhage, and, according to Goodell, this may occur in four ways: First, an effusion of blood behind the placenta, the margins of placenta remaining adherent. Second, when the blood breaks through the membranes into the sac. Third, when the membranes are firmly adherent to the uterine wall and are not dissected away. Fourth, when the presenting part fits the lower uterine segment so snugly that the blood cannot find its way externally. This latter condition, the writer believes, would only occur when the patient is well along in labor and not where the cervix is undilated. The presenting part appears to recede into the uterus when the hæmorrhage comes on before dilatation. The original site where the hæmorrhage takes place is probably the most important factor in determining the variety of the resulting hæmorrhage, and the amount of separation of the membranes is the determining factor as to how much bleeding finds its way into the vagina. In the majority of cases, the blood finds its way out of the cervix. In 486 cases, 365 were external or mixed, and 123 were concealed.

The clinical picture of premature detachment of the placenta presents symptoms of a varying degree in the latter months of pregnancy and during labor. It varies according to the amount of hæmorrhage, and whether or not it is concealed, partially concealed within the uterus, or whether the bleeding is entirely external. In the former conditions, plus the hæmorrhage when it is severe, we have great shock and severe pain, while in the latter there is not much pain, if any, and we have the resulting anæmia in proportion to the amount of blood lost. In the concealed variety the hæmorrhage may be so slight as to escape detection until the labor is finished and the old clot found on the placenta. From this by degrees, we have increasing symptoms until such a severe hæmorrhage occurs as will prove rapidly fatal. In the concealed variety, the uterus is gradually distended until it becomes much larger than normal and is tense and hard and painful to the touch. The patients complain of severe pain over the abdomen. In this condition uterine contractions usually start shortly after hæmorrhage takes place. In the external variety, there is little or no pain, and uterine contractions are weak. In the mixed variety, the symptoms of both previously mentioned varieties are present, and are never consistent with the amount of blood lost externally.

It may be well to describe in detail one case of concealed hæmorrhage. The facial expression is one of great anxiety. The patient is very restless, usually rolling and tossing from side to side, moaning and complaining of pain; the skin is cold and covered with perspiration; there is a rapid pulse, sometimes hardly perceptible. On palpation, we find a very hard

and tender uterus over which we are unable to feel any part of the fœtus. The uterus is oval and greatly distended. On auscultation, no fœtal heart tones or uterine souffle are heard. On vaginal examination no blood is seen. The cervix is very little dilated or not at all. It is hard and resistant. When the os will admit a finger, the presenting part is felt with difficulty and covered tightly by the membranes. There are no contractions of the uterus. In the mixed variety, as just stated, we have symptoms of the internal variety plus external hæmorrhage. Although the uterus is distended there is considerable elasticity and over the lower portion of the uterus the fœtal parts can be felt and the heart tones and souffle be heard. The writer has never been able to outline an accessory tumor in these cases, such as is described by some authors. Great stress should be laid on the fact that the uterus is over-distended in both varieties described, and that the uterine muscle is more or less paralyzed. It, therefore, requires time for the muscle to recover and contract with sufficient force to expel the uterine contents and so insure against a very undesirable complication in these cases, that of post-partum hæmorrhage, against which all authors warn in treating these cases.

Diagnosis. The diagnosis, as a rule, is not difficult, as with the history of the case, the sudden onset, the acute anæmia, shock and other symptoms, this condition is differentiated from the other conditions to be mentioned very readily.

Extrauterine pregnancy with late rupture, or spontaneous rupture of the uterus, may simulate concealed hæmorrhage; but with the large, hard uterus those conditions can be excluded rather than diagnosed. In the external variety the absence or inability to feel the placenta will make the diagnosis positive. Rupture of the uterus, with external hæmorrhage coming on during labor, can be differentiated readily, in that the former comes usually after a prolonged second stage, while the latter may occur and usually does before the second stage is reached. Rupture of circular sinus is usually observed in second stage of labor.

Prognosis. All varieties of premature detachment of the placenta are dangerous and very serious complications of pregnancy and labor. The majority of the children die and many of the mothers.

The statistics give the mortality as follows:

	Mothers, per cent.	Children, per cent.
Goodell.....	50.9	94.4
Holmes.....	32.2	85.8
De Lee (Conc.h.)	50	90
Herzfeld.....	29	82.79
Colclough	9	90
Tweedy Rotunda	10	95

1. The maternal causes of death are, first, hæmorrhage. From the case reports of Goodell and others it appears that the maximum loss with recovery is two pounds. On the other hand, patients have died who have lost a much smaller amount, and others have recovered in whom the clots have weighed two pounds, or a fraction less, with some escape of liquid blood.

2. Non-fatal hæmorrhage plus shock is caused by the rapid distention of the uterus, from the dilatation of the cervix and from operative procedures following rapid dilatation of the cervix, such as version, perforation, and high forceps, and the shock is greater in this class of cases than in many others because the subjects are the poorest kinds to whom to give an anæsthetic and put them under complete anæsthesia. 3. Post-partum hæmorrhage has been severe enough in many cases to have caused death, and from the case reports, although the amount was not great, owing to the patient's collapsed condition, it was enough to settle the question of life or death. 4. Rupture of the uterus is not so rare in these cases and is practically certain to cause a fatal termination. Of the three forms of hæmorrhage, the concealed is acknowledged to be the most dangerous because of the severity of the symptoms. There is often a long delay in the treatment, while with the external and mixed variety there is seldom any delay in sending for medical assistance, as most patients have great fear of bleeding coming on suddenly during the latter months of pregnancy.

Treatment. Colclough gives the following clinical division of the cases that present themselves for treatment:

1. Cases where the hæmorrhage or shock,

or both, have been so severe that the patient cannot recover, no matter what treatment be adopted.

2. Cases where the symptoms are severe, but where a medical man's margin exists; proper treatment will result in recovery, but injudicious treatment will cause a different ending.

3. Cases so slight that under any treatment within certain limits the patient will recover.

The object of treatment should be (1) to secure a good uterine contraction or contractions. (2) To empty the uterus as soon as possible consistent with the safety of the mother.

What the proper treatment should be in the severe cases, where there is a medical man's margin, and the proper time to empty the uterus, are the two important questions to be answered, and since 1775, when Rigby published in his classic paper these two questions as to the treatment, have been much debated. Rigby, in 1789, describes how he waits for slight pains and some dilatation of the os before rupturing the membranes.

John Burns, in 1807, writes at considerable length on the value of the vaginal tampon. Engelby, in 1832, refers to the disputed lines of treatment as follows:

1. Rupture the membranes in preference to turning the child, and follow with delivery.

2. The employment of the tampon until the os uteri has undergone a certain degree of relaxation.

Churchill, in 1842, and Robert Lee, in 1844, discussed the treatment fully. In 1860, Braxton Hicks, and in 1898, G. Ernst Herman, advocated rupture of the membranes and rapid delivery for cases of concealed hæmorrhage. In 1894, Smyly reintroduced the method of tamponing or plugging the vagina, and up to the present time the treatment has not varied from these modes. The use of ergot is a debatable question. The majority of the authors of the present day advise emptying the uterus as soon as possible, and with this warn against the use of the vaginal tampon. Rupturing of the membranes early in severe cases of premature detachment of the placenta was done for the definite purpose of bringing on uterine contractions which are universally conceded to be a check and controller of the hæmorrhage. In the majority of cases, the uterine contractions failed to come and will be delayed longer in these cases than with a normal pregnancy, owing to the distention of the uterus and the paralyzed muscle. Braxton Hicks has fifteen maternal deaths in twenty-three cases under this treatment. The average time of delivery after rupturing the membranes in six cases was fourteen hours. Goodell is very emphatic as to the necessity of early rupture of the membranes. He reports fifty-two cases which recovered; eight of these cases were not severe enough to require treatment. This leaves forty-four severe cases which recovered. Out of this number the membranes were ruptured, but under the following conditions or circumstances:

1. Many hours after the onset of hæmorrhage.

2. When the patient is having strong pains and is in labor.

3. When the os was more or less dilated.

The excellent results of rupturing the membranes in the above thirty-one cases was due to the delay in rupturing them after the uterus had opportunity to recover itself following the hæmorrhage. It was very difficult to analyze many of his cases. Of the fifty cases which died, in fifteen, the membranes were ruptured before any contractions or dilatation of the cervix had set in. The rapid dilatation of the cervix in the many ways we have at our disposal, and the emptying of the uterus by version and extraction, craniotomy or forceps, immediately after the diagnosis is made, is a standard line of treatment, and has given good results, and would no doubt give even better results and reduce the mortality very much were this treatment delayed for a variable time, according to the judgment of the operator, after the initial hæmorrhage has taken place. This delay is practiced especially in the concealed and mixed varieties.

The objections to immediate interference are: (1) These patients are in a state of collapse and further shock is very undesirable. (2) The dilatation of the cervix and the emptying of a pregnant bleeding uterus, after the formation of the placenta, in many cases increases the bleeding in a marked degree,

and this state of affairs obtains in many cases of premature detachment of the placenta. (3) These patients are very poor subjects for anæsthesia, and in some instances the operator has additional difficulties to face in not being able to administer an anæsthetic at all. Scopolamin may have a future as an anæsthetic in these cases. (4) There is great danger of post-partum hæmorrhage after the operation. (5) Lacerations of the cervix.

The indications for delaying treatment are: (1) It gives the patient a chance to rally. (2) The uterus recovers itself and begins to contract rhythmically and with force. (3) Part of the volume of blood lost can be replaced by salt solution and so guard against future loss from our operative procedure. (4) There is much less danger of post-partum hæmorrhage. (5) We can check the original hæmorrhage by the use of a properly applied vaginal tampon and abdominal binder.

The vaginal tampon and binder, as advocated by Colclough, Smyly and Tweedy, and as used at the Rotunda Hospital, have their place in the treatment of this form of hæmorrhage for the purpose of accomplishing the delay just spoken of, and their limits should be the time when the uterine contractions are of good quality and are regular. As we have no standard to guide us in determining the strength of uterine contractions, the removal of the tampon must be left to the judgment of the operator, the condition of the patient, and what dilatation of the cervix the contractions have produced. The above authors leave the tampon in place until the uterine contractions expel it, if within twenty-four hours. Should it remain twenty-four hours, the tampon is removed and replaced. The objections to this line of treatment are: (1) In many cases we unnecessarily prolong the labor. (2) The danger of infection. (3) The danger of rupture of the uterus. (4) Cystitis and vesico-vaginal fistula. (5) The positive loss of the child, which might be saved, or could be saved by a more rapid delivery. (6) Possibility of placenta prævia.

That the plug and binder do control and check the hæmorrhage is a clinical fact, but as to the exact way in which it is done has never been satisfactorily explained. In the description of this method it will be shown that the tampon in the vagina forms a solid mass. The uterus is forced down on this mass by a wide abdominal bandage exerting pressure on part of the fundus and the anterior wall. This pressure outside is transmitted to the fluid inside and, at the same time, the walls of the uterus are prevented from distending. As soon as the intrauterine pressure equals the blood pressure, the further escape of blood is impossible. This is a purely mechanical proposition, and is the only reasonable explanation so far given. The treatment will be successful where the membranes are not ruptured, and even, as shown by case reports, where the liquor amnii has escaped.

Plugging the vagina. Tweedy in 1898 described the process of tamponing the vagina in premature detachment of the placenta. The method in use now differs a little from his description, and the technique perfected somewhat over his. The tampons used are of sterilized cotton wool, about the size of a walnut, and moistened with salt solution, or with a weak bichloride solution. After our usual obstetrical preparations, the patient is placed in the lithotomy position and the fingers of one hand are used as a speculum in preference to a metal instrument, as the fingers separating the vulva can steady and direct the first pledgets introduced. These pledgets are taken out of the solution separately and squeezed almost dry. The first one is placed in the posterior fornix, and the fornices are systematically packed with a moderate amount of pressure. The object is to form a ring around the cervix, and the packing is continued downward until no more can be introduced into the vagina. A large piece of gauze is placed externally, and an assistant holds the tampon in place while the abdominal and perineal bandages are applied. An anæsthetic need not be given. It is only necessary with a very restless patient, and it usually requires very little anæsthesia to keep the patient quiet.

Application of binder and perineal bandage. The binder and perineal bandage should have been placed under the patient before starting operation. Strong pins and a stout unyielding binder are used. The first pin is placed well

above the fundus and the binder secured very tightly downwards as far as the symphysis. The perineal bandage is now pinned well up in front on the binder. In this manner pressure is made on the front of the uterus and abdomen by the tight binder and the uterus is forced downwards as well on the firm vaginal tampon.

Smyly and other writers state that in addition to controlling hæmorrhage, the tampon and binder excite labor pains, induce rapid dilatation of the os, and act as a tourniquet for the uterine arteries. These last three statements may be doubted. The uterus very soon after the tampon and binder have been applied becomes much softer to the touch, and the patient revives in a remarkably short time. In most cases pains begin to occur regularly and with force, and, as stated previously, it is a matter of judgment when the tampon should be removed. There should be, if possible, at least three hours from the time the tampon was inserted until delivery, to insure against post-partum hæmorrhage, and give an opportunity for the patient to rally. The tampon must be removed, first, when the pains become vigorous; second, when the tampon begins to bulge; third, when hæmorrhage appears externally, which shows that the tamponing has not been efficiently done; fourth, any attack of dizziness or faintness. Should nothing happen within eight hours, the tampon is removed, the patient catheterized, and a second tampon inserted. In some cases, conditions are so satisfactory as not to require the application of another tampon. The hæmorrhage when once checked does not start again.

The writer has collected the following cases where hæmorrhage was controlled and pains came on strong.

4 hours or less	15
4 to 7 hours	17
7 to 12 hours	24
12 to 24 hours	10
Over 24 hours	3
	69

Seven deaths; two rupture of the uterus, one died on the fourth day, one died of sepsis on the twelfth day. Out of sixty-nine cases it may be said that the hæmorrhage was controlled in sixty-six cases.

The following cases were selected from the writer's experience to illustrate the different varieties of hæmorrhage and treatment adopted:

CASE 1. Mary O., aged 37. Pregnancy, 14; six children living, two dead, five miscarriages. Examination showed the uterus near full term, child living, and left occipito-anterior position; uterus soft and not contracting. The bleeding started at seven A. M. and increased as the patient moved about. At 8:30 A. M. the hæmorrhage was quite profuse. Patient in good condition. Pulse 120. Os admitted one finger. Tampon and binder applied. Pains came on shortly, and the tampon was removed in two hours and fifty minutes. The cervix was half dilated; membranes ruptured. The head descended into the cervix; dilatation completed, delivery with forceps effected, and child lived. Patient made an uneventful recovery. Placenta showed no marked changes.

CASE 2. Mary L., aged 30; fourth pregnancy. No miscarriages. Pregnant between seventh and eighth month. Examination showed the uterus the size of full term, hard at the fundus, extending down to the level of the umbilicus. There was difficulty in diagnosing the position of the child owing to the tenderness over the abdomen. No heart tones were audible. Vaginal examination showed external bleeding, os not dilated. The patient was in a poor condition; she was anæmic and shocked. Pulse 130 to 140 and of poor quality. Diagnosis, mixed hæmorrhage. Patient started to bleed at 2:30 A. M. Plug and binder were applied by 4:30 A. M. Strong pains at 11:30. Tampon removed. Os admitted four fingers. Breech presentation; membranes ruptured; foot brought down, and dead baby delivered. Clots followed, which weighed twenty ounces. There was no post-partum hæmorrhage. Patient in much better condition. Placenta showed slight changes.

CASE 3. Hannah L. First pregnancy. The history gives a pregnancy of seven and a half months. The patient became ill very suddenly with pain in the abdomen, with nausea and faintness, about 9:30 A. M. I saw her at 10:30. She looked bad and was suffering much. She was unable to talk coherently. Examination showed the uterus larger than full time, hard, rigid, very tender; impossible to outline the child, or to hear any heart tones. The pulse was 150 to 160. Vaginal examination showed there was no sign of bleeding. Os admitted one finger easily, presenting part not palpable. A diagnosis of concealed hæmorrhage was made. The plug and binder were applied at 10:30 A. M.; the pulse dropped very soon to 120; the uterus relaxed remarkably; the patient given resuscitating treatment with good results. Pain started at 4:00 P. M. and at 8:00 P. M the tampon began to bulge. It was removed, and the os was almost fully dilated. Membranes ruptured, and the child was delivered with forceps. Placenta followed in five minutes. The clots weighed two pounds, with some liquid blood. There was no post-partum hæmorrhage. Patient made a good recovery. Child dead. Placenta showed large infarcts. There was no specific history

of renal disease. She was a hardworking woman. She had slight cramps in the abdomen the day previous to becoming ill.

CASE 4. Maria M., pregnancy, eleventh; aged 38; six and a half months' pregnant. Patient had been drinking and fighting shortly before being taken ill. Examination showed a uterus four fingers' breadth below ensiform cartilage, fairly hard and resistant; no fœtal parts made out; no heart tones. Vaginal examination showed considerable bleeding; os undilated. Diagnosis, mixed hæmorrhage. Patient was very intractable and hard to handle. At 8:00 A. M. tampon and binder applied, followed by usual treatment. Her general condition was not bad before operation, and she was comfortable all day. She had some pains, but they were not strong. Owing to many difficulties, the only thing done for the patient was to pass a catheter eight hours after tamponing. At 8:00 P. M. the patient suddenly became very ill, quickly went into collapse. The tampon was removed. The os was fully dilated; the membranes were ruptured, and a dead baby delivered, which presented by the breech. A large tear was found in the left fornix, running into the broad ligament. This was packed, and every effort made to sustain the patient. She died about one and a half hours after rupture. Placenta showed slight changes.

CASE 5. Mary C., aged 40, pregnancy 15. No miscarriages. Examination showed normal sized uterus, very prominent in abdomen. Child in left occipito-anterior position. Patient was then nineteen hours in labor. Vaginal examination showed os almost fully dilated; membranes unruptured, and head not fixed. Pelvis large and roomy. Membranes were punctured with stylet and head descended. Pains were not strong, and one-half hour from the time of rupturing membranes the patient suddenly became very ill; pulse became rapid, and she moved violently about the bed. The uterus was very hard. She was delivered very quickly with forceps; child alive, and followed by several good-sized blood clots and meconium with liquid blood. There was no post-partum hæmorrhage. She recovered nicely. The placenta showed no particular changes. Diagnosis, concealed hæmorrhage.

CONCLUSIONS

1. Rupture of the membranes and leaving delivery to nature are only justifiable when the uterus is contracting vigorously and the os is fully dilated.

2. Rupture of the membranes and rapid delivery should not be done until the uterus is contracting rythmically, the patient rallied, and the os undergone some degree of dilatation.

3. The tampon and binder should be used when there are no contractions of the uterus, no dilatation, and where the patients are in a collapsed state, and its use continued until such time as the patient and uterus have recovered.

4. An external hæmorrhage is converted into a concealed hæmorrhage by the use of the tampon, if the uterine walls are incapable directly or indirectly, of withstanding a pressure within them equal to the maternal blood pressure, and should they be distended as the result of increased intrauterine pressure, the tampon and binder will, if applied properly, render them capable of holding the pressure of the blood and so control the hæmorrhage.

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ACTINOMYCOSIS OF THE UTERINE APPENDAGES[1]

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ACTINOMYCOSIS of the uterine appendages has been observed so rarely that we find no case reported in the medical literature of the United States and only twenty-four such cases in that of Europe. This is not due entirely to the absolute scarcity of this pathological condition, but it may be attributed to the teaching of Bollinger, who demanded that corpora flava must be present for the justification of a diagnosis of actinomycosis. Karewski pointed out the necessity of a close bacteriological examination of the suspicious material. I believe from the experience of my own case that a number of instances have occurred in the practice of many surgeons who deal with large material in which the micro-organism in question was the cause of the disease, but had not been recognized on account of the omission of careful and repeated bacteriological examinations of the specimens by experienced pathologists, such as I had in Dr. Davis, who worked out the pathological side of my case. This holds true possibly for many abscesses and obstinate fistulas, which have not resulted, after removal of the appendages, in a perfect cure.

Actinomycosis has been demonstrated to be a rather frequent affection of the human race, as compared with former opinions, inasmuch as the literature now contains about 650 cases, according to Ruhrah, of which 135 proved to be abdominal manifestations. The subject of actinomycosis, generally speaking, is still one of the most difficult problems from a bacteriological and biological standpoint. This is more readily understood when we peruse an article by Dr. Heijiro Nakeyama, of Tokio, Japan, entitled "Impfversuche auf Acti-nomycosis Asteroides Eppinger an Meershweinchen," Hygienic Institute of Prague.

Many cases may give the impression of tuberculosis macroscopically, and even microscopically they may look so similar to tuberculosis that some of the cases have been denominated pseudo-tuberculosis. Actinomycosis of the human race possesses the property of shaping itself into neat garlands, which form a picture like streptococcus chains, so that Petruscky uses the term "strepto-trichæ" for such microscopical pictures. Shabad makes the following differentiation: 1. Actinomycosis typica produces pus with corpora flava and is non-acid fast. 2. Actinomycosis atypica, pus without corpora flava, acid fast. (*a*) Actinomycosis atypica simplex liquefies gelatin and produces in animals a pseudo-tuberculosis. (*b*) Actinomycosis atypica pseudo-tuberculosis does not liquefy gelatin, and produces pseudo-tuberculosis. Injections of pure cultures in the lower animals met with no success. Wright states after he had made many inoculation experiments with actinomycosis from fifteen different origins, especially intraperitoneally, that the micro-organism of actinomycosis shows little or no infectious activity in such experiments. It would seem, therefore, that other factors, besides the micro-organism, must play a prominent part in the production of a progressive actinomycosis.

Hamm informs us in a recent article in the Beiträge zur Geburtshilfe that he succeeded in producing the disease in animals after injections with pus of actinomycosis. He made an observation of the noteworthy fact that the virulence increases gradually in proportion to the continuation of the inoculation in the same animal species. A very important and instructive experiment in regard to the differential diagnosis is at hand from the hygienic laboratory of Hueppe, which deserves to be mentioned in this connection. Actinomycosis cultures, when injected into tubercular animals, easily kill; while tubercular injections in animals affected with actinomycosis seem to have almost no effect. Interesting is the fact that actinomycosis hyperæsthesia is a temporary condition which gradually makes way for the normal condition after about a month, while a tubercular hyperæsthesia never

[1] Read before the Chicago Gynecological Society, November 19, 1900.

ceases. His explanation is that actinomycosis appears to be more localized and shows a tendency to total restitution ad integrum. As long as this process is not disturbed by secondary adhesions, an unlimited invasion of the organs does not take place. Tuberculosis, however, increases steadily and proceeds from one organ to the other until the whole organism is invaded.

In my second consideration of this subject, I shall deal with the mode of infection of the appendages of the uterus. A study of the different cases found in the literature demonstrates that in none of the cases has positive proof been furnished of primary infection of the uterine appendages, and such origin seems impossible in view of the characteristics of the micro-organism and the anatomical disposition of the organs in question. This statement has reference even to the famous case of Giordiano in 1898. He points out in his case two responsible factors for facilitation and proof of primary invasion, namely, first, prolapse of the uterus, which existed secondly in a poultry fancier, who as such was exposed to the danger from contaminated straw.

H. E. S. Thompson, in the British Medical Journal, speaks of vaginal infection, and desires to be placed on record in that respect, in a case in which the patient had, after repeated attacks of peritonitis, both appendages of the uterus, as well as the appendix vermiformis removed, followed by multiple abscesses of the trunk and the abdomen. His patient died after eight months from gangrene of the right leg. A diagnosis of actinomycosis had not been made up to that time; but autopsy showed actinomycosis, which could then be demonstrated in the preserved adnexa.

My doubts and objection to this interpretation of the mode of infection are: 1. Actinomycosis has not the power and quality of motility the same as the spermatozoon. 2. Actinomycosis does not move by the lymph route as far as is known. 3. It is doubtful whether the blood current is utilized in its transmission. 4. On the other hand, Partsh's and Israel's research work demonstrates that actinomycosis spreads by infiltration, penetration, continuity, and contiguity. 5. It seems quite improbable that the microbe should travel such a long distance as that from the vulva through the vagina, uterine canal, to the ovary and tube, without finding a favorable spot for nestling.

Zeman's case in 1883, which, at the same time, represents the first case of actinomycosis of the uterine appendages on record, was claimed to be one of primary infection for a long time, but the arguments in favor of this condition could not stand the pressure of pathological reasoning. Thompson applied the term "ascending" infection to his case, while just the contrary "descending" forces itself upon us, when we bear in mind, first, that we very frequently introduce small particles of soil adherent to salad, fruit, and other vegetables into the gastro-intestinal tract in a raw state. 2. These particles of soil may be contaminated by actinomycosis. 3. The intestines may be at the time for one reason or another favorably predisposed to the habitation and cultivation of the micro-organic element. 4. That in all cases the intestines were firmly adherent to the pelvic organs.

The mode of infection of the intestine and the spreading of the disease to the peritoneal organs are as follows: Primary actinomycosis of the intestinal tract manifests itself in a superficial invasion of the mucous membrane in the formation of whitish patches, or in the more diffuse variety by the formation of nodules beneath the surface of the mucous membrane. These nodules undergo degeneration, ulcerate, and rapidly extend beyond the original site, invading the greater part of the peritoneum and various organs, especially the liver. As the result of the peritoneal invasion numerous adhesions form, which will prevent a general peritonitis, and, at the same time, may seriously embarrass the surgeon in his attempt to eradicate the disease. (Keen.)

The third consideration pertains to the treatment, which must be two-fold, surgical and medicinal. The surgical treatment follows the rules of other extirpations of infected organs of the pelvis, with the addition of extensive use of the sharp spoon, and the local application of powerful antiseptics, two of which seem to be of special value. One has been suggested by Dr. Arthur Dean Bevan in a paper published in 1904, in which he reported six interesting cases, namely, sulphate of copper solu-

tions in one per cent solution, which has given very satisfactory results in my case; and the other agent, tribromphenol-bismuth, which has been advocated by Hueppe. From the publication of Wolfler's clinic, we learn that out of thirty-nine cases which came under treatment during the last fourteen years fifty per cent resulted in a cure under the combined treatment. He states that there is no difference between the iodide of potash and the iodide of soda, as some claim. His conclusion is that actinomycosis when circumscribed, should be extirpated like every other tumor and if this is not possible, as in the diffuse forms, partial extirpation should be practiced and the iodide of potash administered internally. Tuberculin therapy is still problematical.

Report of case. The patient was a young lady nineteen years of age with a negative family history. She was taken sick about seven years ago with a severe attack of pain in the stomach, followed by vomiting, chills, and fever. Every two or three months she suffered in that way. Three years ago she could not walk erect on account of continuous pains. She did not menstruate for three months, and remained sick all winter. In the spring of that year she went to Denmark. She remained fairly well for a year, but was not entirely free from pain and was always constipated. The diagnoses that were made by different physicians whom she consulted varied between malarial fever, anæmia, indigestion, biliousness, and appendicitis. Of late the pains were located more in the lower part of the abdomen, and were more severe in character, so that the attacks assumed the nature of convulsions. Difficulty of defecation advanced to the state of partial obstruction. After her last attack, different surgeons were called in consultation, and an operation was agreed upon but not performed. The diagnosis was appendicitis. A week after this she came under my observation.

Status præsens. Development of fat and muscles only fair, color of face rather pale, circular and respiratory findings negative, abdomen tympanitic; bimanual examination revealed a large mass in the pelvis. Uterus and ovaries could not be outlined. The masses were sensitive to the touch. Urine-feces negative — leucocytosis 12,000. Diagnosis, double pyosalpinx.

On opening the abdomen through a median incision, a large gelatinous mass was first observed, and beneath this a solid, very resistant, mass occupying the larger and lesser pelvis, could be felt. This condition seemed so unusual to me that I asked Dr. Davis, our pathologist, to step in and give his opinion; but we did not agree as to any definite diagnosis. It looked like a degenerated sarcoma springing from the pelvic bone, but did not seem plausible on account of the long duration of the condition. The increasing bowel obstruction necessitated interference and it seemed advisable to obtain some of the tissue from the growth for microscopic examination. While trying to outline the fundus of the uterus I met very deep down a fluctuating area, into which I penetrated with my finger with the result that an extraordinary copious flow of very fetid pus escaped. This permitted me to return to my first diagnosis of pyosalpinx, and I extirpated both appendages. The gelatinous masses were undoubtedly nothing but distended lymphatics, and the density of the mass finds its explanation in the characteristic pathology of actinomycosis, which tends to fibrosis. The report of the examination of the pus during the operation was negative. A few days later, Dr. Davis found actinomycosis and cultivated the fungus. The convalescence of the patient was accompanied by a rise of temperature. The discharge from the drainage opening was very profuse, we irrigated with copper sulphate solution 1-100. Internally large doses of iodide of potash were administered. The wound closed up after 3 weeks and the patient left the hospital in a very good condition four weeks later. A month afterward she presented herself for re-examination. I found her free from pain, with a good scar in the line of incision, and she had gained quite a few pounds in weight.

PATHOLOGICAL EXAMINATION — DR. DAVIS

Large abscesses, the size of a small orange, occurred in both ovaries. They contained thick, greenish-yellow, tenacious, fetid pus, and the wall, about one centimeter in thickness, consisted on the outer surface of dense connective tissue, within which was a layer of granulation tissue of a reddish color interspersed here and there with regions of yellowish necrosis. About the appendages in the pelvis were large gelatinous masses several centimeters in diameter. The tube, including the finibria on the left side, was firmly bound to the ovarian abscess by old fibrous tissue. The mucosa was not involved and the tube was not enlarged. On the right side the tube and fimbria were likewise firmly united to the abscess by adhesions; but the fimbria and the greater portion of the tube were enlarged and the lumen was distended and contained thick pus. A small portion of the tube near the uterus, by microscopic examination, showed little or no involvement.

Histologically the wall of the abscess may be divided into three zones. The outer zone is composed of dense-connective tissue containing a moderate number of blood-vessels, many of which are surrounded by masses of round cells. Within this zone is a second zone made up of younger connective tissue, as a rule rich in blood-vessels. In many places in this zone the tissue is composed almost entirely of plasma cells. Polynuclear leucocytes are also common, and epithelioid cells in places are abundant. Here also occur giant cells which are large multinuclear cells containing from five to fifteen nuclei always arranged in the center and having abundant finely granular protoplasm. The inner zone is made up almost entirely of pus cells. Here and there are some large cells containing brown

pigment granules, and occasionally cholesterin crystals are seen.

Sections of the tube reveal, in a general way, a structure from without inward similar to that of the ovarian abscess. Many leucocytes are present in the lumen. The mucosa is infiltrated with leucocytes and round cells, and just outside the mucosa plasma cells are often abundant. The wall is thickened and nearly everywhere may be found more or less round cell infiltration. Giant cells of the type above described are here also occasionally encountered in the submucosa.

In smears of the pus Gran's positive, non-acid, fast branching filaments were easily found. No yellow granules were seen microscopically. In the outer part of the tube typical rays were found in sections of the tissue. The branching filaments were easily found also in sections of the ovarian abscesses stained by Gram's stain.

Actinomyces were obtained in pure culture from the pus. Anaerobic and aerobic cultures and also stained smears revealed no other organisms.

The organism is non-acid fast, grows better anaerobically, shows distinct branching, grows slowly, and produces the typical growth of actinomyces on agarn-broth, etc. Inoculation into guinea pigs with pus from the abscess, and with the organism in pure culture, gave negative results.

The stools were examined for pus, blood, and actinomyces with negative results. The urine contained no organisms.

The patient gave a distinct tuberculin reaction (V. Pirquit). She did not react to a concentrated extract of actinomyces prepared by digesting the organisms for several hours with n-10 Na OH.

Following the operation some discharge from the drainage tube continued, in which were found typical branching actinomycotic filaments.

CONCLUSIONS

1. Actinomycosis of the uterine appendages is most likely always a secondary infection.

2. The infection takes place from the gastro-intestinal tract, and may be most frequent from the appendix.

3. The mode of secondary infection is by infiltration, penetration, continuity, and contiguity.

4. Actinomycosis of the ovary and tube in long lasting cases is surrounded by dense, connective tissue formation, which may lead to erroneous diagnoses or different kinds of tumors of hard consistency.

5. The gross macroscopic and microscopic picture resembles that of tuberculosis in many cases.

6. Bollinger's desideratum for the diagnosis of actinomycosis, namely, that corpora flava must be present, is untenable at the present time.

7. Repeated bacteriological examinations, and sometimes long and tedious ones of the same specimens, must be made, to insure a correct interpretation of suspicious pathological material.

8. Inoculation with pure cultures into the animal is not attended with success.

9. Only the injection of pus with actinomycosis, or the ingestion of material upon which actinomycosis is grown, will prove successful in the production of actinomycosis in the animal.

10. Actinomycosis does not travel by the lymphatics, and probably not by the blood route.

11. The prognosis is favorable in circumscribed cases, which is most likely the condition in which we find the uterine appendages.

12. The treatment consists in radical extirpation and free drainage; the application of triboromphenol-bismuth, or irrigation of the fistula with copper sulphate.

13. The internal administration of large doses of iodide of potash up to 75 grains a day, which exerts a positive healing effect.

14. A careful study of apparently innocent pus from pelvic disease as well as secretions from obstinate fistulas after laparotomies for oravian and tubal-pus infections may result in finding actinomycosis more commonly to be the cause of the pathological changes than has been the case heretofore, and in consequence, different treatment inaugurated which will insure, perhaps, a higher percentage of final cures.

SUBCUTANEOUS PERFORATION OF THE INTESTINE

With Consideration of a Mechanism not Hitherto Described

By FRANK A. PALMER, M. D., Morris, Illinois

A PROPER understanding of the mechanism by which perforation of the intestine without external injury of the abdominal walls is produced was not achieved until a comparatively recent date. It was believed by the earlier surgeons that such a rupture of the bowel occurred as a result of a general increase of intra-abdominal pressure, which caused the bowel to burst from the compression of the contained gases. This rather indefinite explanation passed current for a great many years. In 1875, however, Longuet demonstrated by a series of animal experiments that at least the principal factor in the production of such injuries is the crushing of the intestine against the bony walls of the abdomen by the object causing the injury. He threw grave doubts upon the validity of the older bursting mechanism. There remained, however, in the literature three classical cases of perforation of the intestine without direct injury to the abdominal wall which could not be otherwise explained. (Cases of Kaczorowsky, Moritz, and Mikulicz, cited by Bunge, Beitræge zur Klinischen Chirurgie, vol. xlvii, p. 790.)

Moty then came forward with mention of another mechanism by which the bowel was torn between the offending object acting with a sliding motion, and the fixed point offered by the mesentery of the affected loop. He then classified the subcutaneous injuries as occurring as the result of:

1. Écrasement, a crushing of the bowel.
3. Déchirure, a tearing by traction.
2. Éclatement, a bursting from increased pressure within the bowel.

This classification has been pretty generally followed by succeeding writers (Neuman, Petry, Sauerbruch).

Sauerbruch then showed that a bursting rupture of the intestine occurred only if both ends of a loop were occluded at the same time that compression of the contained gases occurred, and maintained that bursting of the intestine through increase of intra-abdominal pressure alone was impossible. He left the cases of perforation of the bowel without direct injury to the abdomen without explanation. Bunge then reported three cases in which he demonstrated that the bowel rupture occurred as the result of intra-abdominal pressure pushing a knuckle of intestine out of an open hernial ring in such a manner that the bowel was burst by the pressure of the fluids and gases contained in it. (See also Borszéky, Beitræge zur Klinschen Chirurgie, bd. lxi, p. 784.) In two of Bunge's cases the injury occurred through simple increase of intra-abdominal pressure, without direct injury to the abdomen. He also demonstrated that one at least of the classical cases, which had hitherto defied explanation, that of Mikulicz, belonged to his group.

Thus we may say that up to the present time only two forms of the bursting rupture have been definitely accepted, — the mechanism of Sauerbruch in which both ends of the loop are occluded at the time that the pressure is applied to it, and the method of Bunge in which the loop of bowel is partially extruded from a hernial opening at the moment that the rupture takes place. The reported cases of these two varieties have all been rupture of the small bowel.

I wish to report the histories of two cases of perforation of the large intestine, which I believe to belong to the bursting ruptures, and which constituting a typical injury, are to be explained by a mechanism which does not fall under either of the above varieties.

Case 1. B. E., about 45 years of age, a teamster for a brewing company, was carrying a keg of beer across a plank laid from the wagon to the sidewalk. The end of the plank slipped from the wagon, and the man fell upon his back with the beer keg upon his abdomen. Laparotomy four hours later showed injury to the mesentery of the small bowel, due to crushing between the keg and the spinal column, from which severe hæmorrhage had taken place. There was also present a hole about an inch long on the anterior aspect of

the head of the cæcum, with a large amount of extravasation of intestinal contents into the pelvis. The patient died a few hours after the operation from the effects of the hæmorrhage.

CASE 2. W. Y., age 38, a lineman, was struck at 4 P. M. by a large piece of a tree stump which was thrown from a blast three or four hundred feet away. The fragment was traveling along the ground, and so struck the unfortunate man as to fracture his right thigh near the knee, and produce an extensive contusion of the abdomen. The blow was a glancing one, carrying away the right half of his coat and vest. He was admitted to the hospital at about seven o'clock with a good pulse (eighty per minute), and very little pain. The rigidity of the recti was present, but slight in amount, and in view of the evident external tenderness of the abdominal wall, and the excellent pulse, was not given the weight that it perhaps deserved. His blood pressure at 9 P. M. was 238 mm. By one o'clock at night the blood pressure had fallen to 98 mm., and the pulse was increasing in frequency. On these indications the abdomen was opened at 4 A. M., twelve hours after the injury. A very considerable amount of blood was present in the abdominal cavity, but no active hæmorrhage. The right half of the abdomen and the pelvic cavity were extensively soiled with fæcal material, the pelvis especially containing a large amount. The peritoneal surface in these regions was red and injected. The only perforation of the bowel present was a longitudinal rent, one and one-half inches in length on the inner anterior aspect of the cæcum, a little above a line drawn from the ileo-cæcal valve to the base of the appendix. The edges of the mucosa were pouting through the wound. The injury was repaired and the peritoneum was carefully cleaned with wet sponges. The abdominal wound was closed with a large packing down to the head of the cæcum. Died on the fifth day of general peritonitis.

These perforations evidently occurred as the result of the ascending colon being compressed first above, driving the contained fluids and gases into the head of the cæcum, and then below, producing such tension in the cæcum as to burst its wall.

In these cases the injury was so located as to make it difficult to conceive that they were produced by crushing, the head of the cæcum lying normally in the pelvic cavity. That the injury was not produced by crushing against the brim of the pelvis is evinced by the fact that in the second case the rent ran parallel to the axis of the ascending colon. Further in both cases the extravasation of fæcal material was far in excess of the amounts one would expect from leakage in the times given.

It is also to be observed that in distinction to the cases hitherto reported, the injury was to the large bowel, in a portion where its fixation to the abdominal wall makes the occlusion of both ends difficult to imagine. Also the nature of the injury was such as to make it readily conceivable that the pressure may have been exerted first to the upper portion of the colon, and a moment later to its lower portion.

In view of the fact, that the area of the opening through the ileo-cæcal valve is so small in proportion to the area of a cross section of the cæcum, a rupture of the cæcum from the tension of its contained fluids and gases should be expected under such circumstances, whether the ileo-cæcal value was patent at the instant or not. But it is quite conceivable that the valve might be occluded at the given instant, by the distortion produced by the traction of the mesentery of the ileum acting against the tendency of the cæcum to carry the ileum with it in its downward movement, resulting from the downward rush of the cæcal contents.

At any rate we have here, evidently, a typical form of perforation of the intestine resulting from a definite form of injury, and seemingly presenting a definite location of lesion.

Two other points are of interest in connection with the cases. First the extensive soiling of the peritoneum with fæcal material due to the explosive character of the perforation, giving it an especially grave prognosis, and secondly, the value of the fall of blood pressure as an indication of internal hæmorrhage, as illustrated in the second case.

PELVIC TRANSPLANTATION METASTASIS AS A MEANS OF RECOGNITION OF HOPELESS ABDOMINAL CARCINOMA

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IN the treatment of all carcinomata it is quite as necessary to have definite rules for guidance against operation as for operation. It is important to lay stress upon every warning point, as the present necessity for exploration only emphasizes our more or less limited knowledge, and it is our duty to save as many patients as possible from the shock of even so slight an operation as a simple exploration, when by a more thorough examination some of them might at once be definitely classified as hopeless.

It is to routine digital examination of the rectum with the patient in the knee-elbow position, and bimanually with the patient in the lithotomy position, to which we wish to call particular attention in this paper; and no case of abdominal tumor should be operated upon without its being done. By this means alone we have been able to prove over six and one-half per cent of upper abdominal carcinoma to be hopeless.

While reviewing the histories of some four hundred and thirty-five cases of upper abdominal carcinoma seen in the last twenty months at the Mayo clinic, Rochester, Minnesota, we were surprised to find so large a percentage of them showing the following positive contraindication to operation. For example, upon examination a small, hard, nodular tumor is found with the clinical history and laboratory findings of carcinoma of the stomach. It is freely movable and apparently mechanically removable. On rectal examination at a point about three to five inches from the anus along the anterior rectal wall (on what has been termed by Dr. George Blumer the "rectal shelf"), above the prostate in the male, and above and behind the uterus in the female, we may find a hard nodular mass distinctly originating within the peritoneal cavity. These may be single or multiple and may vary in size from a small bean to an orange. Sigmoidoscopic examination shows the rectal mucosa uninvolved. This may remain as a distinct neoplasm or may, through a process of infiltration, begin the formation of a cresent-shaped area of cartilaginous hardness that partially surrounds the bowel. We have not seen a case that produced any stricture-like symptoms, nor have we seen one that gave symptoms suggestive of rectal carcinoma. The presence of free fluid in the abdomen often indicates a hopeless condition because it is indicative of a considerable peritoneal irritation and usually actual involvement, but implantation carcinomata are often found before free fluid can be distinguished clinically and before secondary masses can be distinguished through the abdominal wall. It must be borne in mind, however, that negative findings are of no value. One must also be guarded against mistaking for this condition, fæcal concretions higher up in the sigmoid, and old inflammatory deposits in the pelvis. Tuberculous peritonitis can be differentiated by the "feel" of the mass, its location being more diffuse, taken together with the history of the patient. Dr. Blumer cites a case where a small subperitoneal myoma projecting into Douglas' pouch caused some confusion. He also calls attention to the fact that Houston's fold of the rectum is sometimes thickened.

Once the peritoneal covering of the primary growth has been broken through, the carcinoma cells are spread in more or less numbers throughout the serous cavity by gravitation, intestinal movements, or the normal circulation of the intraperitoneal fluid. We believe that a fair percentage of these cells will early find their way to the lower part of the cavity, and because of the position of the rectum acting as a shelf, they will in many instances lodge thereon. The tendency to gravitate to the pelvis is more pronounced because most of the patients with upper abdominal carcinoma are able to be about and often do light work.[1]

[1] This is contrary to those experiments where shot have been introduced within the peritoneal cavity and are found not to gravitate to the pelvis; nevertheless, the clinical evidence seems to warrant this assumption.

The above findings, which are brought out better by the rectal examination than by the vaginal, have been of value also in leading to a positive diagnosis of carcinoma of the stomach in cases where no tumor could be palpated even on distention. They are also, if present, positive proof in the differential diagnosis of carcinoma from that little understood class of cases with a stomach history and laboratory findings typical of carcinoma of the stomach, but in which no cancer is present. Findings of this character will also establish the diagnosis between a well starved ulcer case with considerable tumefaction and a carcinoma case. A few cases have been referred to us as being pelvic. Examination showed findings as described above and directed our attention to a stomach history the patient had not emphasized, and here we found the primary and important condition.

Several years ago in this clinic, when attention first began to be paid to these pelvic deposits, a few cases were operated upon, the local condition being such as to indicate a radical procedure, but on slipping the hand into the pelvis the peritoneal deposits were found to be definitely carcinomatous. Through correspondence we found, further, that quite a number of patients similarly affected where operation was refused solely because of the deposits, had died in a few months. As a means to more exact prognosis such deposits demonstrate the life of the patient to be positively limited and to have passed beyond the operative stage.

In the four hundred and thirty-five case histories, were three hundred and seven cases of carcinoma of the stomach, the remainder being of the intestine, pancreas, liver, and gall-bladder. In this number twenty-eight showed secondary deposits on the rectal shelf or in the cul-de-sac of Douglas. No secondary deposits were to be palpated through the abdomen, and with two exceptions, abdominal fluid was clinically questionable or absent. Of the twenty-eight cases, four had palliative operations for obstructive symptoms; two of these were pyloric, one ileocæcal, and one of the ascending colon. Of the nineteen cases not operated upon, the clinical diagnosis was primary cancer or cancer on ulcer in all but four, and these were diagnosed carcinoma of the liver, and carcinoma of the upper sigmoid. Regarding sex, our series is at variance with some other reported cases as showing a larger percentage of females, namely, ten of twenty-eight cases. The tendency for detached malignant cells to implant themselves upon uterine adnexa was shown by two cases of gastric cancer with secondary malignant ovarian tumors found in the same period. A few cases only showed rectal symptoms of increased constipation during the last few months, and three showed irritable bladder developing. The constipation could hardly have been attributed to the size of the mass; the irritable bladder might have been due to deposits on the bladder wall.

In the series of four hundred and thirty-five cases we found eighteen cases of supraclavicular gland enlargement. Several glands were subjected to microscopic examination, but the majority of patients were refused operation on the clinical findings alone, the supraclavicular glands being the deciding feature. Only two cases showed both supraclavicular and pelvic metastasis. One case showed right-sided, and one right and left sided glandular involvement, and the remainder were left-sided only. These do not include a few cases where we were unable to locate the primary focus.

If the number of cases here reported may be taken as a fair average, then the pelvic deposits are of much more value as a means of decision as to the inoperability of a given case than the supraclavicular metastasis, and by means of pelvic and supraclavicular metastasis more than 10 per cent of the whole shown to be hopeless without exploration. It is only within the last few years that attention has been called to this sign in the current literature by such men as Schnitzler, Kæppeler and Kellog of Germany, Mr. G. Gray Turner of England, and Dr. George Blumer of this country.

Age seems to have little influence as regards whether these warning flags shall be hung in the pelvis or in the shoulder. Both types showed cases in all of the cancer decades.

SUMMARY

1. Rectal examination is absolutely necessary in all abdominal tumors.

2. Of 435 consecutive cases of carcinoma of the upper abdomen six and one-half per cent showed pelvic transplantation deposits as the earliest clinical sign of inoperability. Seven and two-tenths of stomach carcinomas had this sign.

3. Fifty-five per cent more cases were shown to be inoperable through a thorough rectal examination for pelvic metastasis, than because of the presence of supraclavicular gland metastasis.

4. Pelvic metastasis warrants a most unfavorable prognosis as regards life expectancy.

CONGENITAL DIVERTICULA OF THE BLADDER[1]

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THE following study is based upon an interesting case, observed by the author in the early part of the year 1907.

On March 14, 1907, I was consulted by a gentleman 75 years of age for an affection of the bladder, from which he had suffered for nearly ten years. He had been a sickly child up to his sixth year. Later in life he had always been well until his sixty-fifth year. He never had any gonorrhœal or syphilitic infection, but states that all his life he had a peculiar condition of his bladder. Frequently during micturition, the flow of urine would suddenly stop, although the desire to urinate persisted. Upon straining a little he would empty his bladder satisfactorily. His urine had always been clear. About ten years ago he noticed that his urine was bloody at intervals. Shortly afterwards he discovered that he could not empty his bladder completely and that he had to urinate more frequently during the day, and that he was obliged to rise a couple of times during the night. A physician advised him to use the catheter, which he has done ever since. The urine became cloudy and contained mucus. He always has been able to pass a certain amount of urine without the catheter, but he was compelled to use it to "get out what remained," in order to obtain relief. Even after he had emptied his bladder completely, as he thought, a feeling of fullness remained. During the past two years he frequently passed, with much pain, small, hard and softer bodies that he thought were stones.

Status præsens. Patient is a well-built, but emaciated man. His complexion is sallow, the expression of his features denoting a good deal of suffering. Thoracic and abdominal viscera show no abnormalities. Slight arteriosclerosis. He passes water almost every half hour with much pain. Urine ammoniacal, cloudy, containing a trace of albumen, many pus cells, desquamated bladder epithelium, and mucus. He passes about 15–20 cc. at a time. Prostate found not enlarged by palpation per rectum. Bladder cannot be percussed above symphysis, but there is a resistance above the symphysis and towards the right side of the linea alba, which is painful on pressure. No tumor can be palpated. A 23-F. Mercier catheter can be introduced into the bladder without difficulty. There is no stricture of the urethra. Only a few cc. of cloudy urine are withdrawn. In filling the bladder only 35 cc. of fluid can be introduced. In attempting to introduce more, the patient complains of much pain and inability to hold the fluid. Upon pressure over symphysis, no fluid flows from the catheter.

No stone can be felt. A diagnosis of chronic cystitis with contracted bladder and the possibility of a sacculated stone or a congenital diverticulum was made. The probability of the last was considered on account of the peculiar difficulty of emptying the bladder, from which the patient has suffered from early boyhood.

To throw a little more light on the condition, a cystoscopy was attempted, but failed on account of the impossibility to fill the bladder, and its irritability which could not even be overcome by local anæsthesia. I did not deem a general narcosis advisable. Therefore it was decided to do a suprapubic cystotomy to which the patient eagerly assented.

Operation, March 17, 1907, under anæsthol-narcosis. Suprapubic cystotomy. On opening the bladder it was found that its walls were very much hypertrophied.

[1] Read in abstract before the Genito-urinary Section of the New York Academy of Medicine, April, 1909.

The viscus itself was small, its lumen very narrow. The mucous membrane was injected, but everywhere perfectly smooth. There was no hypertrophy of the prostate or stone. Both ureter openings were present. Near the summit of the bladder on its right lateral wall, there was found a round opening with smooth borders about the size of a quarter. The mucous membrane of the bladder was arranged in radiating folds toward this opening which led into a pouch, almost double the size of the bladder itself, its lowest point reaching down into the pelvis. The mucus membrane of this diverticulum was very much inflamed and thrown into an irregular network of trabeculæ, crossing and recrossing each other, giving exactly the picture which we are accustomed to see in a "vessie à clonne" in prostatics. Its walls were very thick, almost thicker than the wall of the bladder proper. The cavity of the diverticulum contained a large amount of amorphous material consisting of urinary sediment and foul-smelling pus and mucus. The mucous membrane of the bottom of the cavity showed here and there small spots of superficial ulceration.

After cleansing the pouch thoroughly, a drainage tube was inserted into the diverticulum and led out through the cystotomy wound. A Witzel fistula was then established. No drainage tube was put into the bladder itself. The condition of the patient did not warrant a radical extirpation of the sacculation. The patient was put to bed and a syphon-drainage established. The convalescence was uninterrupted, the patient being out of bed on the third day p. op. At the beginning, there was some leakage beside the tube, but this soon ceased and the fistula was tight; all the urine from the diverticulum drained into the syphon-bottle. On the third day p. op. patient commenced to void small quantities of urine through the urethra, 30 to 40 cc. at a time. The quantities drained from the diverticulum varied between 1,080 to 2,500 cc. in twenty-four hours.

The after treatment consisted in carefully washing out his bladder and diverticulum through the drainage tube and in the administration of urotropin 0.6 t. i. d. per os.

Patient left the Hospital on the fourth day of April much improved. His constant desire to urinate and his pain had left him and he felt comfortable and satisfied. About one year later patient died of uraemia due to an ascending pyelo-nephritis.

Unfortunately it was impossible to get a post-mortem examination, so that I was not able to procure the specimen. In my mind, there is no doubt but that we had to deal with a large congenital diverticulum of the bladder. This opinion is substantiated by the history of the patient. As long as he remembered he could not empty his bladder completely; the flow of urine would suddenly stop and only after an additional muscular effort this would be accomplished. There was absolutely no obstruction to the flow of urine, either in the urethra or the bladder, as evidenced by the smoothness of the mucous membrane of the bladder, the absence of prostatic hypertrophy and the contracted state of the bladder. This last condition is easily explained by the long standing chronic cystitis. The wall of the diverticulum was undoubtedly composed of all three coats of the bladder. The mucous membrane could be inspected at the operation. The trabeculated condition of this membrane pointed with certainty to an underlying coat of strong muscular fibres, which assumption is further strengthened by the evident thickness of the wall of the diverticulum, which even exceeded that of the bladder wall itself.

A good deal has been written on the subject of diverticulum of the bladder, but except the report of single cases scattered through the literature, there exists no comprehensive study of this condition. Only in the French literature is found an excellent and thorough study in the thesis of Alcée Durrieux, who up to 1901, besides his own case, collected 194 observations. In Germany Pagenstecher, Englisch, and Wagner have contributed to our knowledge. In our English literature no comprehensive paper exists. If one reviews the literature, one is struck by the fact that a diagnosis of this condition during life has rarely been made, not because it is impossible to do so, but for the reason that this anomaly is rarely thought of. It is obvious that this has led in many cases to unfortunate results for the patient. Considering the various and serious complications that may arise and eventually, if not properly treated, cause the death of the afflicted, one realizes the necessity and importance of an early accurate diagnosis.

Definition. Diverticulum, double bladder, bladder-cells, cysts of the bladder, saccules, sacs, pouches, false bladder, are terms that are used to designate an abnormality of the bladder, consisting of a receptacle of varying capacity, connected with the bladder by an orifice of variable diameter. These terms were used formerly interchangeably, without a clear or definite conception of the pathological condition to be designated. But in late years, since the pathology of these extra-vesical cavities has been studied more closely, it has been found that their origin and causative factors differ so widely that it was necessary to establish a definite nomenclature in order to avoid confusion. A perivascular abscess breaking through into the bladder and a protrusion of mucous membrane through the interstices of the muscular wall have the same end-effect in producing an extra-vesical cavity

connected with the bladder, although their mode of production is essentially different. In the older medical literature we find cases reported by Rauling, Riolan, Blasius, and Collot as "double bladder" which undoubtedly were nothing else but large diverticula. Even as late as 1863 Michele Scibelli describes a case of congenital double bladder with a very much dilated lower end of the right ureter as a triple bladder.

Morgagni was probably the first one to recognize the true nature of diverticula. He attributes the formation of diverticula to a hypertrophy of the bladder wall, the true cause of which is, in his opinion, hypertrophy of the prostate.

During the last century, Tenon, Morgagni, Houstet, and Chopart were the first to show the true significance of these cavities in connection with the bladder. Since that time the mode of formation, character, and symptoms of diverticula have been carefully studied. The first one to propose the theory that diverticula were formed by a hernia of the mucosa through the muscular coat was Cruvelhier. He named this condition "hernie tunicaire." The important distinguishing sign of these diverticula is the fact that they have *no muscular coat.* But Mercier, Civiale, Cruvelhier, and Robelin were able to demonstrate muscular fibres in certain diverticula. Virchow, Birch-Hirschfeld also found muscular fibres. Therefore a division was necessary into *congenital* diverticula *with musculosa* and *acquired* diverticula *without muscular coat.*

According to Durrieux, the definition of diverticula is the following: Diverticula are certain cavities in close connection with the bladder which are due to an expansion of a portion of its walls. They are characterized by: 1. The presence of an opening which is clearly defined, forming the communication between the cavity of the bladder and that of the diverticulum. 2. By an absence of an ureteral opening. 3. By a mucous lining which is continuous with that of the bladder and covers its whole inner surface.

J. Englisch, who has studied and written a good deal about these anomalies, distinguishes the following types:

1. The divided bladder: *a.* By a vertical septum. *b.* By a horizontal septum, away from the opening of the urachus.

2. Diverticula of the bladder: *a.* True diverticula, containing mucosa and muscularis; *b.* False diverticula, consisting only of mucosa, the "hernie tunicaire" of Cruvelhier.

The divided bladder and the true diverticula are congenital; the false diverticula are always acquired.

1. THE DIVIDED BLADDER (*Vesica bipartita, Vesica duplex*)

Before I speak about this congenital anomaly, I must refer shortly to the embryological development of the bladder. Until recently it was assumed that the bladder was composite in origin, its upper part being developed from the allantois alone, while in the formation of the trigonal region both allantois and cloaca take part. The allantois is developed from the caudal pole. Ultzmann [1] thinks the double bladder is formed by a failure of the two halves of the allantois to unite. In this case two cavities are formed, in each of which one ureter opens.

This view cannot be upheld any longer. According to the investigations of Lieberkuehn, Keibel, Retterer, and Reichel,[2] the bladder, at least its lower segment and the central portion of the urethra, are developed from the anterior half of the cloaca itself. The allantois plays little part in the formation of the bladder. We know now that the allantois in the human being is imperfectly developed and has relations to the urachus only.

Pagenstecher [3] distinguishes two types of the double bladder. The first type shows a division of the bladder into two cavities by an anteroposterior partition or a constriction. Fuller [4] reports two cases. The accompanying figure 1 illustrates the condition. The patient was a man 44 years old who had bladder symptoms since early life. He acquired gonorrhœa several times with a consequent stricture. Chronic retention of urine. Albuminuria, uræmic symptoms. Perineal section.

[1] Ultzmann. Krankheiten der Blase.

[2] Reichel. Die Entstehung der Missbildungen d. Blase und der Harnroehre. Arch. f. Klin. Chir., bd. 46.

[3] Pagenstecher, E. Angeborene Blasendivert. und Doppelblasen. Arch. f. Klin. Chir., bd. 74, 1905.

[4] Fuller. Anteriosubdivision of Bladder. An important anomaly. Jour. Cut. and Gen.-Urin. Diseas., Dec., 1900.

A small stone was removed from the lower, smaller cavity. Suprapubic cystotomy. Division of stricture. Death after ten days.

The other patient was a man 55 years old who had urinary trouble since his childhood; frequent and painful micturition. When 25 years old he noticed difficulty in emptying his bladder. He came under observation when 55 years old with augmentation of his symptoms and hæmaturia. The bladder seemed dilated. Attempt at catheterization caused hæmorrhage, therefore a perineal section with drainage of the bladder was done. After 10 days the drain was removed, which was followed by a renewed retention. The examining finger finds a mass blocking the outlet of the bladder, which feels like bladder wall. On suprapubic section the anomaly is detected and the narrow communication incised. Drainage. Cure.

In both these cases the horizontal dividing wall was situated in front of the ureteral openings so that the urine was emptied first into the upper and posterior compartment. The anterior and lower compartment had a capacity of 1–1½ ounces and had thick walls. The posterior cavity was larger and similar to the bladder cavity proper. The two compartments were joined by an oval opening admitting two fingers. In the first case the opening was circular and admitted the tip of the index finger. *The dividing wall had the thickness of a double hypertrophied bladder wall.*

This type is best designated as *congenital hourglass bladder.*

We find an analogy of this condition in different congenital strictures, valve and fold formations of the urinary tract as well as in the strictures and artresias of other hollow organs, i. e., intestinal tract (the congenital hourglass stomach, etc.).

The bladder is made up of two parts which differ embryologically from each other. The upper portion with folded mucous membrane, the urine reservoir proper, and the smooth trigone. The latter, according to Kalischer, belongs to the urethra. The upper part of the bladder is developed at an earlier period than the trigonal region. If development of upper and lower part does not take place in the proper proportion a constriction between the two will be the result, which becomes permanent.

Another case that belongs into this class is reported by Detwiler.[1] Man 69 years old, suffered from urinary symptoms for three or four years. Development of scrotal abscess with urinary fistula. Stricture of the urethra. Death from exhaustion. At autopsy the bladder was found much thickened and enlarged. All over its internal surface small sacs and pouches (20 to 30), from the size of a wheat grain to that of a walnut were found. *The bladder was almost divided into two compartments by a contraction in its center, which caused it to resemble an hourglass.* At the top of the upper cavity was a pouch of walnut size. The opening between the two principal sacs was just large enough to admit the point of the index finger. In conclusion the author states: "I can hardly account for the large pouch on top. I hardly think it could have formed that way (i. e., like the small pouches), as it was almost as large as the lower end of the hourglass and had quite thick walls (much thicker than some of the smaller sacs)."

A similar condition was found in Cutters' case[2] in a boy of 11 years, who died from a perforation, with consecutive peritonitis, of an ulcer situated in the upper compartment.

The dividing constriction between the two cavities may lie above or below the entrance of the ureters into the bladder. Pagenstecher believes that the development of this anomaly dates back as far as the fourth week. (Embryo of 7 mm.)

The second type is shown in Figures 2 and 3, the first corresponding to the condition in the male, the second corresponding to the condition in the female. In these instances two organs are present (a true duplicated bladder). The septum which divides the two bladders reaches at least down to the trigone. Both empty either into a common urethra (in males) or each has a separate urethra (in females). The two organs are very often separated from each other by a furrow into which a fold of the peritoneum dips. This furrow is often occupied by coils of intestines. Each bladder has usually one ureter. With very few exceptions in all the cases reported there were

[1] Detwiler. An hourglass bladder. having many sacs, etc. Va. Med. Month., vol. xv, page 644.

[2] Cit. after Englisch. Isolierte Entzuendung d. Blasendivert. und Perforations peritonitis. Arch. f. Klin. Chir., bd. 73. 1904.

found other anomalies: bicornate uterus, double uterus and double vagina, artresia ani, etc. In Schatz's case [1] there were found two uteri, two vaginæ. Each bladder is in communication with one vagina. The ureters were wanting and the kidney showed cystic degeneration. Gleiss (loc. cit.) reports a case of a female child with two anal depressions, two anal furrows, double labia majora, vagina, urethra, and bladder. On incising the left anal furrow, the gut was encountered at a depth of 3 cm. and showed a distinct and completed septum, allowing of no communication between right and left rectum. Lange's case (loc. cit.) presented a double penis, artresia ani, double raphe of the scrotum, two anal folds, two anal depressions. Also a double urethra, double bladder, each with one ureter. There were two fistulæ coming from the blind rectal pouch each emptying into one of the urethræ. In Volpe's case (loc. cit.) there was a double colon, the right one emptying itself into the right bladder, the left one into the left bladder. There was a horseshoe kidney present with only one ureter. The penis consisted of two corpora cavernosa. There was also found a diastasis of the symphysis pubis. All these cases were children who were stillborn, or died very soon after birth.

Different theories have been advanced to explain these anomalies. The old theory that a duplication or a division of the allantois is responsible for them must be discarded in the light of our modern embryological views. Reichel (loc. cit.) thinks that the malformation is brought about at a time when the primitive cloaca and the genitourinary sinus begin to be separated by the two Rathke's folds. According to the latter author this takes place in the following fashion: On either side of the gut, at the point where it enters the cloaca, there are developed projections or folds, the so-called "Rathke's folds." (Fig. 8, RF.) These two folds produce three depressions on the dorsal wall of the cloaca. The median one (Fig. 8, D) constitutes the direct prolongation of the gut, the two lateral ones (Fig. 8, W) are prolongations of the Wolffian ducts which enter the cloaca higher up. The two Rathke's folds grow downward and eventually blend in the median line (Fig. 9, RF), thus forming a closed channel, the rectum, and separating the urogenital sinus from the gut. If these folds should in some way or other grow to such an extent as to reach the anterior wall of the urogenital sinus (as indicated by the dotted line), it is easily conceivable that two distinct cavities are formed.

This theory would, however, not clear up the origin of those cases where a double rectum, vagina, and penis are found. Pagenstecher therefore assumes that these malformations must have originated at a very early period of embryonal life when a differentiation of the parts had not as yet been effected. They are the result of a duplication of the whole urogenital system, both of entoblastic and ectoblastic origin.

We come now to that form of congenital malformation of the bladder which is more important to us clinically than the foregoing, the so-called congenital diverticula.

2. THE CONGENITAL DIVERTICULA OR VESICA BILOCULARIS

The cases that belong to this class have one feature in common, namely, the bladder is divided into two compartments by a septum which is situated not in the median line but mostly a little towards the left. In the great majority of cases this septum runs in a vertical direction from before backwards, but it may also be found to run obliquely from above downward and in a transverse direction, so that the bladder is divided into a lower and an upper part.

The walls of this septum consist of two bladder walls which are in close apposition and which are made up of muscularis and mucosa. Viewed externally such a bladder does not show any constriction or furrows to indicate the site of the septum. *Both ureters empty into the main bladder.* The two cavities communicate with each other by a circular or an oval opening of varying size. This may be so small as to hardly admit a small sound or large enough to admit the tip of a finger. This opening may be located in the middle of the septum, but more often it is found nearer its upper or lower border. The position of this communication is of some importance. The

[1] Cit. after Pagenstecher.

Fig. 1.

higher it is placed the more difficult it will be for the urine to flow back into the main compartment and to be emptied through the urethra.

This form of congenital diverticula is represented by a case reported by Huppert and by the author's case. (Fig. 10.) In Huppert's case the diverticulum was placed on the left side and its opening was in the middle, whereas in the author's case, the diverticulum was situated on the right side and the opening was placed high up towards the vertex. These diverticula are sometimes also found double, one on either side, as described by Durrieux. (Fig. 11.) A rare form of diverticulum is reported by Juetting. This author describes a preparation from the pathological collection of Muenster, Germany. Girl, one to two years old. The bladder shows a septum three finger breadth long, two finger breadth wide. It does not lie in the median line but towards the left. There are found four ureters; two of them empty themselves into the right half of the bladder, the third ureter runs through the posterior wall of the bladder and the septum and empties itself into the right half, the fourth ureter enters the left part of the bladder.

In the foregoing two forms of congenital malformations of the bladder, the two cavities are closely joined together. There are, however, types in which the diverticulum is more or less separated from the bladder proper, so that its walls are more or less distinct. Sometimes the diverticulum is joined to the bladder by a more or less pronounced neck. If such specimens are not examined carefully, they may be confounded with simple acquired diverticula that consist merely of a prolapse of mucous membrane through the muscular coat. The majority of these diverticula are formed on the left side, and they lie most frequently behind the bladder and in the hollow of the sacrum. The bladder proper is therefore pushed upwards and towards the right. They are rarely covered to any extent by peritoneum.

The mouths of the diverticula are for the most part situated in the neighborhood of the ureters. Most frequently they are found a little above and towards the lateral walls of the bladder. Very often we see that the mucous membrane of the bladder is arranged in radiating folds running towards the opening. This is brought about by a sphincterlike arrangement of the muscularis of the bladder. In some of the cases a sphincter action of these openings could be clearly demonstrated, as in the cases reported by Pagenstecher, Czerny, and Zacharisson.

Sometimes the opening of the diverticulum lies at the site of the ureter. In such cases the ureter opens into the diverticulum, notwithstanding Durrieux's opinion to the contrary. The relationship of ureter and diverticulum is of great importance. If two ureters exist, they both empty into the main bladder

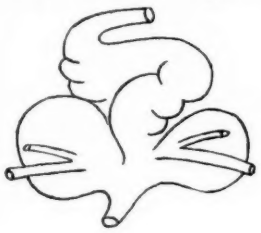
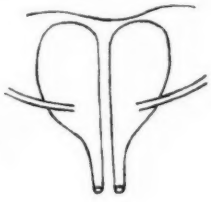
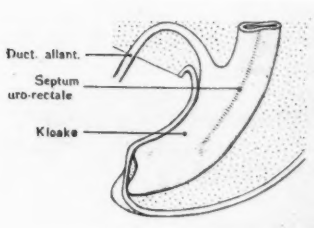


Fig. 2.



after Pagenstecher.

Fig. 3.



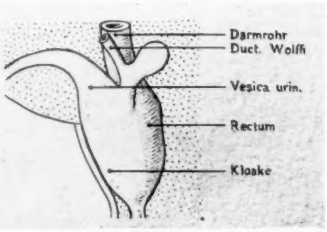


Fig. 4. Fig. 5.

Development of the bladder (after Kollmann)

which also contains the trigone and the urethral exit, or one ureter empties into the right cavity, the other into the left one. If more than one ureter are present, two of them are in connection with the main bladder, one may pierce the septum and the fourth may be in connection with the diverticula (case Juetting).

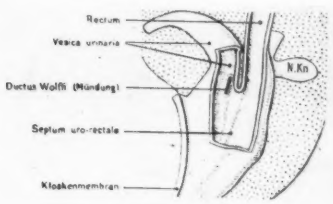
In some cases the ureter is in such close connection with the diverticula, running along its posterior wall that during extirpation it must be cut and reimplanted into the bladder wall (case Czerny).

The urachus is mostly single and in connection with the main bladder.

How can we explain the formation of these congenital diverticula?

Englisch and some other writers believe that the formation of congenital diverticula is based upon the presence of some obstacle to the outflow of the urine, in consequence of which the weak points of the muscular arrangement of the bladder give way (Fig. 12). These obstacles may be produced by inflammatory conditions of the bladder or urethra, during intrauterine life, but which have healed out leaving no vestiges after birth. After Englisch the opposing epithelial layers become agglutinated during embryonal life, occluding the urethra. This occlusion is relieved at a later date by the back pressure of the secreted urine. This theory would, however, explain only the type represented by Fig. 11, but would not explain the type of diverticula which are formed by a vertical or a horizontal partition. In my opinion the formation of the congenital diverticula and the bilocular bladder can best be explained by the theory of Pagenstecher, who holds that they are produced by a folding in of the bladder wall, brought about by a superfluity of embryonal tissue which has to accommodate itself to a certain space in pelvis.

Pathology. The presence of a diverticulun of the bladder is always followed by certain pathological changes in the bladder and the diverticulum itself. The first and most important is a hypertrophy of the bladder wall. This is a very interesting condition, as the usual cause for hypertrophy, an obstruction at the outlet, is not present. How, then, can this hypertrophy be explained?



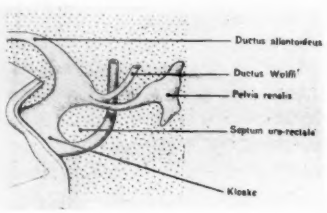


Fig. 6. Fig. 7.

Development of the bladder (after Kollmann)

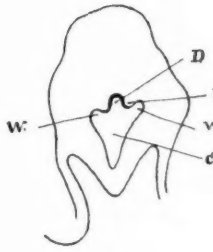


Fig. 8.

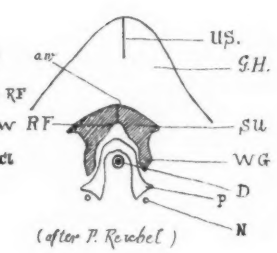


Fig. 9.

Rehfisch, in his experiments (Ueber den Mechanismus des Harnblasenschlusses und der Harnentleerung) arrives at the following conclusions: 1. During the emptying of the bladder, the pressure in the cavity of the bladder falls and the organ expels its contents. If a diverticulum exists, this empties its fluid into the bladder at the same time. There is, therefore, an additional quantity of urine which the bladder muscle has to expel, in consequence of which the muscle must hypertrophy, in order to do the extra work thrown upon it. 2. At the beginning of micturition the pressure in the cavity of the bladder *does not fall*, but the contractions of the bladder are so vigorous that the pressure rises. Thus, the urine is forced out of the bladder into the diverticulum, putting its walls under higher pressure. If now the pressure in the bladder falls, a perfect equilibrium in diverticulum and bladder cannot be restored. The detrusor muscle having reached its highest point of contraction and the sphincter of the bladder being closed, before the diverticulum has had time to rid itself of the surplus of urine, there will always remain a residue of diverticular urine in the bladder. The musculature of the bladder with each contraction has to cope with more fluid than is actually expelled with each micturition. This means more muscular work, therefore hypertrophy.

Refisch very aptly compares these conditions with the mechanism of hypertrophy of the heart in valvular disease. Type 1 would correspond to stenosis of an arterial ostium, type 2 to the insufficiency of a valve.

The diverticulum is therefore the primary cause of the hypertrophy of the bladder.

The diverticula are often the seat of grave pathological changes. The mucous membrane becomes inflamed through the irritative presence of decomposing urine. This inflammation may go on to a complete gangrene of the mucous membrane, or even of the muscularis with perforation into the peritoneal cavity and subsequent purulent peritonitis. Englisch has published and collected a large number of such cases. The development of stones in the diverticula is frequent.

Symptomatology. Congenital diverticula of the bladder may be present for a long time, before they give any signs of discomfort. Some patients state that they have suffered from "a weak bladder" as long as they can remember other patients only experience symptoms for a short time. The main symptom in all is frequent micturition at the outset. Later this is accompanied by pain. This pain may be situated in the abdomen, where it has the character of pressure or fullness, or it may only appear as a burning and stinging sensation during and at the end of micturition. After urinating there is in most cases a feeling as if the bladder was not completely emptied and the desire to urinate persists, or comes on again shortly after voiding. Some patients suffer from complete retention earlier or later in life. This complete retention may even be the first symptom of the anomaly. The urine becomes cloudy and contains mucopurulent material.

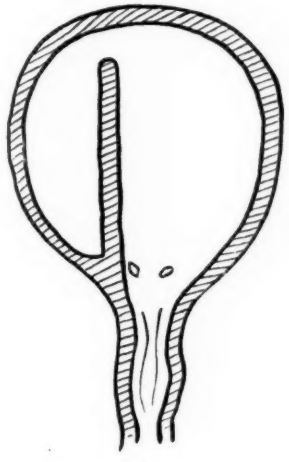


Fig. 10.

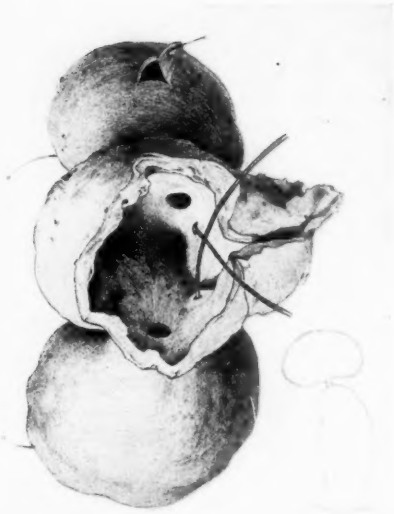


Fig. 11.

On and off hæmaturia may be present. These pathological findings make their appearance as soon as the urine in the diverticulum stagnates and commences to show ammoniacal fermentation. Then all the symptoms are aggravated. Stones may develop in the diverticulum and add to the misery of the patient. If the kidneys become implicated, as they very often are, in the later stages of the disease, symptoms of pyelitis and pyonephrosis may develop with septic temperatures, an attack of uræmia finally closing the tragedy.

On examination there is often found a tumor above the symphysis on either side of the bladder. Or, if the diverticulum lies behind and below the bladder, a tumor that fills the hollow of the sacrum may be palpated per rectum or vagina. If a catheter is introduced into the bladder, a larger or smaller quantity of urine is withdrawn; if pressure be exerted over the tumor an additional amount of urine is obtained, often of a different character and in large amounts, one quart and more is not infrequent. This is the residual urine contained in the diverticulum. As soon as the residual urine is removed the tumor will disappear.

Where a cystoscopic examination is possible, the entrance into the diverticulum may be seen as a dark hole of varying size into which under favorable conditions the cystoscope may be passed and the interior viewed and the presence of possible stones noted. (Fig. 13.) The picture which presents itself is usually so characteristic that it can hardly be mistaken for anything else. Under certain conditions, however, it may be extremely difficult to distinguish between the mouth of an ureter and the opening of a diverticulum. This is the case when the diverticular opening is of small size. The openings of the diverticula are very often near the mouth of the ureters and in such cases the question may arise, whether we have to deal with a supernumerary ureter or with an opening of a diverticulum.

Tilden Brown and Osgood have used a very ingenious method to make the diagnosis with certainty. They introduced into the questionable opening a ureter catheter armed with a stylet and had an X-ray picture taken. The plate showed the catheter coiled up in a cavity. thus demonstrating with certainty that they had to deal with a diverticulum. Through the kindness of Dr. Tilden Brown I have been enabled to reproduce his Roentgen picture here. (Fig. 14).

Treatment. The treatment of this condition may be *conservative*, or *palliative*, or *radical*. There are cases reported which have been made comfortable for years by careful catheterization

Fig. 12.

Fig. 13.

with the subsequent flushing of the bladder with various weak antiseptic solutions. Besides the local treatment the patient should have benzoic acid and urotropin internally with a liberal allowance of some indifferent table water. His general condition should be improved by diet and hygienic measures. By these means the patient may be kept in fairly good condition. As the presence of a diverticulum, however, is always a grave menace to life, operative treatment should strongly be urged upon the patient. There are different operative procedures at our disposal. For the sake of simplicity I shall divide them into *palliative* and *radical operations*.

Suprapubic cystotomy, as a palliative meas-

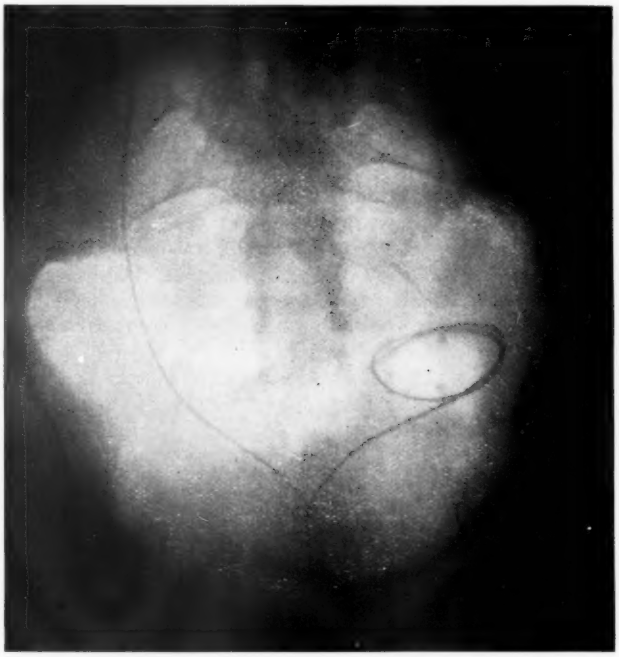


Fig. 14.

ure, has been resorted to in a number of cases. This operation was undertaken either as a diagnostic measure, because the actual pathological condition was not clear, or because the condition of the patient was such that a removal of the diverticulum was too hazardous. Wulff and Pagenstecher employed suprapubic drainage as a preliminary step and extirpated the diverticulum at a secondary operation. Langer in his cases besides drainage dilated the orifice of the diverticulum. Zacharisson, Lennander, and Young destroyed the septum between the diverticulum and the bladder and Ljungren established a large communication between diverticulum and bladder after the fashion of a gastroenterostomy. This method seems rational and has been followed by good results, but it does not remove the sac, although the conditions for emptying the diverticulum are improved. Extirpation of the diverticulum, if the condition of the patient allows it, is the operation of choice. It has been employed by Wulff, Czerny, Pagenstecher, Wagner, and Young. All cases treated by this method were cured. Pean extirpated the mucous membrane only and effected a cure.

According to the location, there are different ways of operative procedure. For those diverticula which lie on either side of the bladder or which are situated at the vertex, the suprapubic extraperitoneal route should be selected. In cases where the diverticulum lies below and behind the bladder the sacral route with temporary resection of the sacrum is the best. This last method was employed by Pagenstecher with good results.

Mortality. The mortality from congenital diverticula is very high. Of the forty-eight cases collected from the literature which were treated with and without operation, thirty-two died, total mortality 66.7 per cent. There were twenty-eight cases operated on, of these ten were cured. One improved, and eight died, 40 per cent mortality. Six of these patients were subjected to primary or secondary resection; all of them recovered and were cured. Eleven patients were treated by suprapubic cystostomy with drainage of the bladder with three cures, one improvement, and six deaths. In one the mucous membrane of the diverticulum was excised (Pean) with cure.

In twenty-eight patients an operation was not done, either on account of their poor condition or because the diagnosis was not made. Of these twenty-four died, 84.3 per cent mortality. In three patients in which the diagnosis was made the outcome is not known. One patient died of typhoid fever and the diverticulum was found at the autopsy table. *The best results, therefore, are obtained by radical extirpation,* if the diagnosis is made at a time when the patient's general condition is still a fairly good one.

Sex. The disease is most frequently found in men, the ratio between the sexes being about ten to one (males 41, females 4). Among the cases collected there were also two children in which the sex was not mentioned and one fœtus.

Age: 1 to 10 years old	4
10 to 20 years old	3
20 to 30 years old	2
30 to 40 years old	9
40 to 50 years old	4
50 to 60 years old	6
60 to 70 years old	7
70 to 80 years old	2

One was a fœtus. Two patients were stated as "old man," and in eight the age was not given. The table shows that in the majority of cases urgent symptoms most often appear in the third, fifth, and sixth decennium. It seems that in a good many cases the diverticulum was borne with comparatively little discomfort until another pathological process was added. This may be a gonorrhœa with or without stricture (Czerny, Huldschiner, Hagemann, Young), a prostatic hypertrophy (Huppert, Paltauf, Chopart, Bonnetus), or the development of a stone (Langner), or the infection of the bladder by catheter or through autochtonous infection of stagnating urine.

COLLECTED CASES

1. WULFF. Male, 34. One diverticulum on right lateral wall. Treatment: Suprapubic cystotomy, secondary extirpation. Result: Cure, residual urine, 150-200 cc.
2. MEYER. Male, 43. One diverticulum on right lateral wall. Complications: Both ureters dilated. Result: Death. Diverticulum smooth; trabeculated bladder.

3. CZERNY. Male, 31. One diverticulum on left side. Complications: Stricture of urethra. Pyelo nephritis. Treatment: Extirpation. Result: Cure. Later nephrectomy.
4. HOFMOKL. Female, 56. One diverticulum on left side. Result: death.
5. WRIGHT. Male, 38. One diverticulum on right side and behind bladder. Treatment: Suprapubic cystotomy, drainage. Result: Death.
6. STRAUSS. Male, 29. Two diverticula on right and left sides. Treatment: Suprapubic cystotomy, drainage. Result: Cure.
7. LANGER. Male, 38. Frontal septum, bilocular bladder. Treatment: Suprapubic cystotomy, dilatation of diverticular opening. Result: Death.
8. LANGNER. Male, 6. Bilocular bladder. Complications: Stone in one cavity. Result: Death.
9. HUPPERT. Male, (1). Bilocular bladder. Result: Death from typhoid.
10. HULDOCHINER. Male, (1). One diverticulum on vertex of bladder. Complications: Gonorrhœa. Treatment: Dietetic. Probably a non-obliterated urachus.
11. HAGEMANN. Male, 50. One diverticulum on left side. Complications: Urethritis. Treatment: Conservative. Suffered since his fifth year.
12. PEAN. Female, 15. One diverticulum anterior to bladder. Treatment: Excision of mucous membrane. Result: Cure.
13. MACKINDER. Male, 54. Bilocular bladder. Result: Death.
14. DETWILER. Male, 69. "Hour glass" bladder. Complications: Left pyonephrosis. Dilatation of ureters. Stricture of urethra. Cystic kidney. Result: Death.
15. KOLLOSSOW. Male, 40. Bilocular bladder. Result: Death. Right kidney with two pelves.
16. ZACHARISSON. Male, 1¾. One diverticulum on left side. Complications: Left pyonephrosis. Phimosis. Retention of urine. Treatment: Suprapubic cystotomy, destruction of septum. Result: Death. Left kidney with two ureters.
17. PAGENSTECHER. Male, 33. One diverticulum on right side. Treatment: Suprapubic cystotomy, extirpation, implantation of ureter. Result: Cure.
18. WAGNER. Male, 48. One diverticulum on right side. Treatment: Extirpation and suture. Result: Cure.
19. WAGNER. Male, 80. Diverticulum on right side behind bladder. Result: Death. Autopsy findings by Paltauf.
20. WAGNER. Male, 55. Complications: Pyelitis, chronic. Dilatation of ureters. Result: Death. Autopsy findings by Paltauf.
21. WAGNER. One diverticulum on right side. Complications: Dilatation of bladder. Result: Death. Autopsy findings by Paltauf.
22. CHOPART. Male, old. Bilocular bladder. Complications: Prostatic hypertrophy. Stricture of urethra. Result: Death. Many small false diverticula.
23. PETIT. Male, old. One diverticulum behind bladder. Complications: Gangrene of mucous membrane, Result: Death. Several smaller false diverticula.
24. CADGE. Female, 61. One diverticulum on right side. Complications: Gangrene of mucous membrane, peritonitis. Result: Death. Two false diverticula.
25. LJUNGREN. Male, 12. One diverticulum behind bladder. Treatment: Suprapubic cystotomy. Communication established between bladder and diverticulum. Result: Cure.
26. BONNETUS. Male, 57. One diverticulum on left side. Complications: Prostatic hypertrophy. Mucous membrane of diverticulum ulcerated. Result: Death.
27. LE ROY D'ETIOLLE. Male, 65. One diverticulum behind bladder. Complications: Perinephritic abscess. Dilatation of ureters. Treatment: Catheter à demeure. Result: Death.
28. CUTTER. Male, 65. Bilocular bladder. Complications: Peritonitis following perforation. Result: Death.
29. ENGLISCH. Male, (1). One diverticulum on right side. Treatment: Suprapubic cystotomy. Result: Death.
30. YOUNG. Male, 47. Seven diverticula on right and left sides, anteriorly. Treatment: Catheterization. Result: Death.
31. YOUNG. Male, 30. Two diverticula on right and left sides. Complications: Gonorrhœa eleven years ago. Treatment: Extirpation. Result: Cure.
32. YOUNG. Male, 34. One diverticulum on vertex of bladder. Treatment: Extirpation. Result: Cure.
33. YOUNG. Male, 22. One diverticulum on left side. Complications: Dilatation of ureters. Stricture of urethra. Treatment: Dilatation of stricture. Result: Death.
34. FISCHER. Male, 65. One diverticulum on right side. Treatment: Suprapubic cystotomy. Drainage. Result: Improved. Death one year later from ascending pyelonephrosis.
35. CIVIALE. Male, 60. One diverticulum on vertex of bladder. Result: Death.
36. CIVIALE. Male, (1). Two diverticula on right and left sides. Complications: Slight prostatic hypertrophy. Result: Death.
37. BURCKHARDT. Male, 34. One diverticulum on right side. Complications: Pyelonephritis. Treatment: External urethrotomy. Result: Death.
38. CIVIALE. Male, 38. Three diverticula, two on vertex of bladderand one behind the bladder. Treatment: Catheter à demeure. Result: Death.
39. LIONVILLE. Female, (1). Two diverticula on right and left sides. Result: Death.
40. FLEURY. Child, 8. One diverticulum. Complications: Calculus in diverticulum. Treatment: Perineal cystotomy. Result: Cure.
41. BUCKSTONE BROWN. Child, 3. One diverticulum in hernial sac. Complications: 2 calculi in diverticulum. Treatment: Suprapubic cystotomy. Result: Death.
42. CABOT. Male, 57. Two diverticula on right and left sides. Complications: Calculi in diverticulum. Pyelonephritis. Result: Death.
43. MERKEL. Fœtus. One diverticulum Result: Death.
44. FRANK. Male, old. Bilocular bladder. Result: Death. One ureter for each cavity.
45. MENDOZA. Male, old. Bilocular bladder. Complications: Calculus in each cavity.
46. ALBARRAN. Male, (1) One diverticulum. Treatment: Suprapubic cystotomy. Result: Death.
47. GUYON. Male, 68. One diverticulum on right side. Complications: Dilatation of ureters. Prostatic hypertrophy. Calculus.

48. DURRIEUX. Male, 60. Two diverticula on right and left sides. Complications: Prostatic hypertrophy. Treatment: Suprapubic cystotomy and drainage. Result: Death.

NOTE—Nos. 38 to 48 cited after DURRIEUX.

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POSTURAL TREATMENT AND LAVAGE OF THE RENAL PELVIS FOR THE RELIEF OF PYELITIS OF PREGNANCY[1]

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FEW men in writing upon the subject of pyelitis in pregnancy make any distinctions between the lesions of pyelitis, pyonephrosis, suppurative nephritis, and pyelonephritis. These four conditions represent very distinct lesions which, as a rule, are characterized by different symptoms and call for radically different methods of treatment. In the present report the writer will not consider the suppurative infections of the kidney which have been present before pregnancy and whose presence has been emphasized by gestation and excited into renewed activity, but this report will include only those cases in which the patient enters upon her period of pregnancy with a perfectly healthy kidney and during the course of her gestation is seized with an attack of acute suppurative inflammation of the pelvis of one or both kidneys.

[1] Read before the Brooklyn Gynecological Society, April, 1909.

True pyelitis of pregnancy is an acute catarrhal inflammation of the pelvis of the kidney, which occurs suddenly during the course of a normal pregnancy, is acute in its onset, usually unilateral, affecting more frequently the right than the left kidney, running an acute course, and tending to spontaneous recovery without permanent injury to the kidney. Pathologically, there is a dilatation of the pelvis of the kidney with inflammation of its lining membrane and some congestion of the parenchyma of the kidney, causing an enlargement of that organ, with engorgement; at first the parenchyma is not invaded by the pathological process.

The occurrence of the disease I believe to be much more frequent than has formerly been supposed, for in the past six months seven cases have come under my care, exclusive of all the cases in which there has been a history of previous inflammation of the kidney prior to the pregnancy. Vineberg, in his paper on "Pyelitis in Pregnancy and the Puerperium," published in the American Journal of Obstetrics for June, 1908, was able to collect only one hundred and twenty-three cases from the literature of this disease, but as this included a number of cases of puerperal pyelitis, the actual number of reported cases would be less than this.

As to the relative frequency of pyuria in pregnant women, the Copenhagen Maternity Hospital Reports show that as a result of careful urinary examinations in over seven thousand cases, pus was found present in the urine in only six per cent; and in the majority of these cases the pus was due to inflammation of the bladder.

There has been much discussion as to the cause of this acute inflammation of the pelvis of the kidney, and the view has now become generally accepted that it is due to pressure upon the ureters by the pregnant uterus. This theory has received considerable support from the observations of Cruveilhier, who made a careful study of the condition of the ureters in pregnant women, and at autopsy he found that the ureters were markedly dilated in all the women who died after confinement or during the latter months of pregnancy. It is rather difficult, however, to understand how the uterus could be the sole etiological factor in those cases which occur during the earlier months of pregnancy, in one case of my own it having occurred at the third month.

From my own studies I would conclude:

First. That a few cases were brought about by toxic influences and hæmatogenous infection in a kidney, whose vitality has been lowered owing to the occurrence of a pregnancy; this is probably the cause in pyelitis occurring in the earlier stages of pregnancy. (See case No. 2.)

Second. That from the appearance of the bladder as viewed from within, it would seem very probable that the distortion of the vesical portion of the ureter (due to the presence of an enlarging uterus) could easily cause an obstruction to the free flow of urine into the bladder and favor a catarrhal inflammation of the ureter and pelvis, the infection being either hæmatogenous or by direct extension from the bladder. In some cases it has been observed by the writer that the bladder was compressed from above, downwards, by the pregnant uterus, so that the ureter was made to bend sharply at the point of its entrance into the bladder, or was kinked in its course through the bladder walls (as in case 1). In other cases the bladder is flattened from before, backwards, also offering possibility of distortion of the ureter.

Third. That pressure and distortion of the ureter above the brim of the pelvis, due to the enlarging uterus after the sixth month, is a frequent contributing cause.

Symptoms. The usual history is that of a woman, pregnant from the fourth to the eighth month, whose previous history has been perfectly normal, when without discoverable cause, or from exposure, during the night or when rising, is seized with severe, cramp-like pain referred to the abdomen; there is usually a slight chill, with nausea and vomiting; the pain recurs, is persistent and usually localizes either in the bladder or in the region of one of the kidneys. It is to be remarked, in passing, that frequently all the pain is referred to the bladder; there is a sharp rise in temperature and the patient feels decidedly ill. Urination increases in frequency, becomes painful, and oftentimes the call for relieving the bladder is

almost continuous; the chill, with rise of temperature, is repeated, and the patient has recurrent pains in the region of the kidney lasting for a few days; *the blood examination* shows the typical picture of a suppurative process; usually a disproportionately large percentage of polymorphonuclear cells, generally above 85 per cent and many times above 90 per cent; *the urine* is usually acid and contains pus in varying quantities; the muscles of the abdomen protecting the region of the affected kidney show spasmodic rigidity; and pressure, especially in the costovertebral angle, causes pain; the kidney is swollen, and if the uterus is not too large the kidney can be palpated.

Cystoscopic examination reveals, usually, the bladder moderately inflamed, otherwise normal excepting for the pressure upon it of the pregnant uterus; and the catheterized specimens from the kidneys will show pus mixed with urine from one kidney, while that collected from the other is normal excepting that it generally shows a large number of granular renal epithelium cells present, and the mucous membrane of the healthy ureter and kidney bleeds more easily than that of the diseased side.

In an uncomplicated case, the temperature gradually drops after five or six days, and in the course of two weeks becomes normal; the secretion of pus from the pelvis usually lasts for a considerable period of time after all symptoms of inflammation have subsided.

PROGNOSIS. J. F. W. Ross, Professor of Gynecology in the University of Toronto, advises the practitioner to terminate the pregnancy if the condition be a serious one. C. B. Reed claims that premature labor occurs in fifty per cent of the cases; forty per cent of the women going on to normal labor at term. Cragin believes that if the child has reached the viable age in utero and the evidences of pyelitis still persist with pain, temperature, and pyuria, interruption of the pregnancy is justifiable. The writer believes that termination of the pregnancy is seldom necessary.

REPORT OF PERSONAL CASES

CASE 1. Mrs. Miller; Case No. 163. Referred by Dr. A. F. Griffiths.

Patient aged nineteen; primipara; patient became pregnant in June, 1907, and has had no abdominal trouble until the present time; has had no vaginal discharge and no bladder irritability.

November 10, 1907, at about the end of the fifth month of pregnancy, the patient had a violent chill, was nauseated and vomited twice during the day; had sharp lancinating pain in the right side of the abdomen referred to the region of the right kidney or the gall-bladder; bowels had moved normally; pain extended and became more or less general in character. On the twelfth day after the inception of the trouble, a slight jaundice appeared; she suffered continually from severe headaches and intermittent pain in the right side; there was some rigidity of the muscles protecting the right renal region and the gall-bladder; deep pressure caused pain over this region, and there was also general abdominal tenderness; pus and epithelium were present in the urine; patient had an acute granular vaginitis, non-specific in character. Under medical treatment and rest in bed the patient rapidly improved; the temperature, which at first had been high became normal, and after ten days the patient was allowed to return home.

January 17, 1908, the patient had improved considerably in general health but her appetite had not returned; there was an increased amount of pus in the urine and there had been a moderate increase in frequency of micturition; there was some pain during the passage of urine.

January 18, 1908, a cystoscopic examination was made by the writer, and a catheter passed to the pelvis of the right kidney; the bladder mucous membrane showed little congestion, but the mouth of the right ureter was slightly congested; one ounce of residual urine was found in the pelvis of the right kidney; urine reaction was alkaline; specific gravity 1.020; gross appearance very cloudy, twice as cloudy as the urine collected from the bladder by catheter; slight trace of albumin. Microscopical examination of this urine showed it to be loaded with pus and granular renal epithelium. Bacteriological examination showed *a pure culture of colon bacillus*.

The pelvis of the kidney was washed with sterile salt solution and injected with two drams of a twenty per cent solution of argyrol.

Seven days later, a second cystoscopic examination was made which showed the lumen of the bladder markedly encroached upon by the enlarging uterus; the bladder was seen to be flattened from above downwards, that is, its long axis was antero-posterior, making the direction of the vesical portion of the ureter posterior and inferior; that is, instead of a gentle curve upwards along the posterior surface of the bladder, the first direction of the ureter was downward, so that with a direct cystoscope in order to catheterize the ureters the instrument had to be carried upward over the abdomen until it struck against the pubic arch.

This was the first case that suggested to me that very probably the obstruction to the flow of urine through the ureters took place, in some cases, in the vesical portion of the ureter or at the point where the ureter leaves the bladder wall, the ureter being either bent or flattened out at this point. As observed through

the cystoscope, the distortion of the wall of the bladder is very marked.

At this second examination, the left ureter opening was seen to be normal; the right ureter opening was slightly congested; a catheter was easily passed to the pelvis of the right kidney and a very small amount of residual urine was found. The specimen obtained in this way showed that the condition of this kidney was very markedly improved over that of the previous week, so that whereas the pus in the previous specimen had collected in large amounts at the bottom of the test-tube, in the specimen collected on that day there was so slight a suspension that there was simply a cloudy appearance to the urine; after ten minutes the urine which came from the kidney was less cloudy than the first urine, and after fifteen minutes an irregular rhythm in the dropping took place. The pelvis of the kidney was again injected with two drams of a 40 per cent solution of argyrol. After this treatment the patient was markedly improved, and although microscopically there were numerous leucocytes found in the urine, still there was no pus deposit on standing.

Three weeks later the patient was successfully delivered of a normal child, with no evidences of renal disturbance. She has made a complete recovery and at the present time is perfectly well.

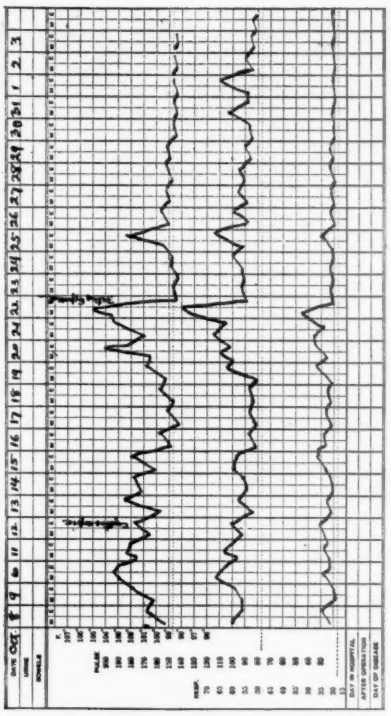
REMARKS. This case illustrates a number of conditions which have not previously been noted by other observers. In the first place, at the end of the fifth month of pregnancy the patient had an acute attack of pyelitis without previous renal disease; it was unilateral, being confined to the right kidney; under medical treatment the acuteness of the attack subsided, and she returned to her home where she had no further trouble for two months; all of this time, however, there continued to be present a subacute catarrhal inflammation of the pelvis of the kidney; as the uterus enlarged, pressure on the ureter increased, and she had a recurrence or an acute exacerbation of the inflammation. As a result of draining the residual urine during this second attack and then stimulating the mucous membrane of the pelvis with a 20 per cent solution of argyrol, the process was very materially checked and at the end of a week there was present simply a slight catarrhal inflammation without any other symptoms. At the end of seven days there was markedly less residual urine, and the pelvis was again stimulated and washed with argyrol with the result that there was hardly any pus remaining in the urine, and she proceeded without further trouble to make full term delivery three weeks later.

The second point of interest is the fact that the urine taken directly from the pelvis of the kidney was alkaline in reaction, and later, when the process became less acute, it became neutral. In a discussion before another medical society it was stated that the acid reaction of the urine was pathognomonic of pyelitis, and my statement made at that time that frequently the urine was alkaline, has been proven by many subsequent exact observations. It is a fact, however, that in a case of pyuria where the urine is markedly alkaline, the inflammation is almost always most severe in the bladder, and where the pus is of renal origin, if due to pyelitis without much retention of urine, the reaction is usually acid. However, when we have a residual urine of any large amount in the pelvis of the kidney, the urine may easily be alkaline in reaction.

The third point of interest in this case was the appearance of distortion of the bladder due to the presence of the enlarging uterus; in no other case have I seen this so marked, for with a direct catheterizing cystoscope it was necessary for me to pass the catheters downward and backward in order to engage the first portion of the ureter, a condition analogous to that found in prolapse of the uterus with cystocele, with the exception that in this case the fundus of the uterus could be outlined within the bladder compressing it from above, downward, and encroaching greatly upon its lumen so that certain portions of the bladder appeared as mere slits. It is in such cases as this that two things are justifiable; either a termination of the pregnancy, or a renal lavage. Medical treatment and postural treatment fail to affect the condition except temporarily. If nothing be done to relieve the compression, a chronic pyelitis may result.

CASE 2. Mrs. Felsen, aged 28. Case No. 210. Referred by Dr. George MacNaughton.

Two-para; last period three months ago; some leucorrhœa for past five months; had one child three years ago, labor normal; no miscarriages; general health good. Patient has had considerable nausea and vomiting for the past three months; two weeks ago begun to have a slight bloody vaginal discharge; four days ago was seized with severe cramp-like pains in the lower part of the abdomen; had numerous slight chills; two days ago had a sudden sharp pain in the abdomen, and fainted; has had great difficulty in urination accompanied by pain and burning.



Case 2. Pyelitis of pregnancy. Patient aged 28. End of third month. Multipara. Aborted. Recovery

October 9, 1908, was admitted to the hospital; temperature 99.4° and pulse 100; desired to pass urine every five minutes; urine cloudy and foul; reaction acid; specific gravity 1.030; large quantity of pus present; leucocytes 11,000; polymorphonuclears 86 per cent. Medical treatment was instituted with elevation of the head of the bed but no improvement was noted during the next three days; temperature reached as high as 103.6°; persistent vomiting; pain was referred to the region of both kidneys.

October 12, 1908, cystoscopic examination showed marked general cystitis present; ureters catheterized showed urine containing a large number of pus cells coming from both kidneys.

Bacteriological examination showed in each case a bacillus with all the cultural characteristics of a *colon bacillus*. Pelvis of each kidney irrigated with 25 per cent solution of argyrol, and one dram left in the pelvis. Daily bladder irrigations and silver nitrate installations in the bladder were given, as well as a continuous Murphy proctoclysis. Urotropin administered in 15-grain doses, t. i. d. For a few days temperature ranged lower, but patient's general condition was decidedly worse and vomiting was occurring at intervals during the day.

October 19, 1908, patient's condition became so serious that it was decided to empty the uterus.

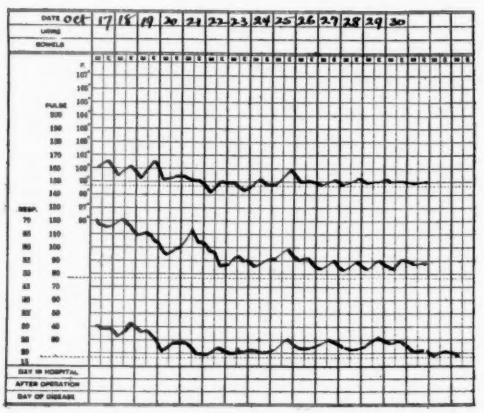
October 22, 1908, after the introduction of bougies, which were in place for two days, the temperature reached 105°, and shortly thereafter the fœtus was expelled. Following this the patient made an uninterrupted recovery, and was discharged from the hospital November 4, 1908, with no symptoms of infection referable to the kidney.

REMARKS. In this case we have a patient in the third month with a double pyelitis of pregnancy; the condition of the fœtus when it was expelled showed beginning degeneration of a greater degree than would be expected two days after insertion of bougies for abortion; neither the posture nor the irrigations with argyrol affected the case; it seems to me that in this particular case the cause was rather a septic infection of the kidneys than one due pressure of the developing uterus upon the ureters.

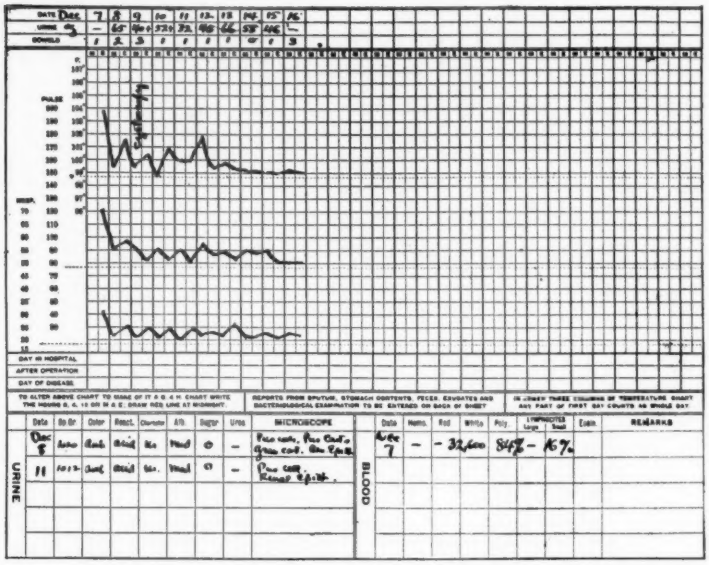
CASE 3. Mrs. Urdang, aged 26. Case No. 211. Referred by Dr. O. P. Humpstone.

Primipara; last period six-and-a-half months ago. Twelve days ago patient was awakened in the morning with a sharp, stabbing pain in the left lumbar region, which was relieved by hot applications; vomiting; bowels constipated; involuntary urination; urine loaded with pus; no casts. Temperature from 100.6° to 96.6°; leucocytes 10,000; polymorphonuclears 70 per cent; pain in the left lumbar region continued and she was admitted to the hospital.

October 20, 1908, cystoscopic examination; moderate degree of cystitis; left ureter opening slightly in-



Case 3. Pyelitis of pregnancy. Patient aged 26. 6½ months. Primipara. Renal lavage. Elevated trunk posture. Recovery.



Case 4. Pyelitis of pregnancy. Patient aged 19. Primipara. Full term. Renal lavage. Elevated trunk posture. Recovery.

flamed; urine collected from left kidney showed a few hyaline casts, epithelium from the pelvis of the kidney, many pus cells and polymorphonuclear leucocytes. In a single field, under the microscope, using 7-A objective and a No. 2 eye-piece, there were sixty pus cells in the field. Urine from right kidney showed a few leucocytes, and a number of red blood cells probably of traumatic origin, also a few hyaline casts; the pelvis of each kidney was washed with a 25 per cent solution of argyrol.

Bacteriological examination: *Urine from both kidneys sterile.*

Patient was put in the elevated head and trunk position, urotropin was given and the bladder was irrigated with 25 per cent solution of argyrol twice a week. Temperature remained practically normal.

October 27, 1908, a second examintion was made and the pelvis of the left kidney again irrigated with argyrol; urine from this kidney at second examination showed very few pus cells present, and all the signs of inflammation had subsided; next day patient was allowed out of bed.

November 4, 1908, patient was discharged from the hospital entirely cured.

Remarks. This case presents the typical picture of an acute catarrhal pyelitis of pregnancy, probably due to pressure of the enlarging uterus; no infecting bacilli were found, but they were probably present. As in the first case, an examination of the urine after a week, taken from the diseased kidney, showed a very marked diminution in the absolute number of pus cells present.

Case 4. Mrs. Diamond, aged 19. Patient at full term.

November 30, 1908, patient had a sudden, sharp pain in the right lumbar region, which did not radiate in any direction; high fever but no vomiting; bowels had been regular; no examination of the urine was made.

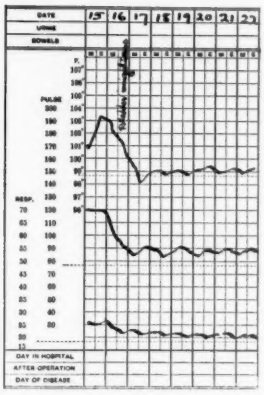
December 4, 1908, patient was delivered of a normal child.

December 6, 1908, had a chill, and later a high fever with great prostration and pain referred to the left lumbar region; no urinary symptoms; she was markedly prostrated and suffered considerably.

December 7, 1908, temperature 104°, pulse 120, respirations 40; urine was acid; specific gravity 1.020; contained pus casts and many pus cells, granular casts, and renal epithelium.

Blood examination: 32,000 leucocytes; 84 per cent polymorphonuclears. Temperature was septic in type.

December 9, 1908, cystoscopic examination revealed a general cystitis of the bladder; urine from left kidney showed pus cells and flocculi; right ureter not catheterized; pelvis of the kidney irrigated with argyrol. Patient placed in elevated head and trunk position; urotropin administered; bladder irrigated; for next three days temperature was slightly irregular, but on the fourth day it became normal; on the sixth day pa-



Case 5. Pyelitis of pregnancy. Patient aged 21. Six months. Elevated trunk posture. Recovery without renal lavage, but using bladder irrigation.

tient was allowed out of bed and made an uneventful recovery.

September 16, 1908, patient was discharged.

REMARKS. The case just detailed is an example of an acute pyelitis occurring at term; it is an example of a condition which may cause a severe septic state a few days after delivery, and in all cases of septic conditions following delivery a thorough examination of the urine may help to clear up the diagnosis.

CASE 5. Mrs. Silbert, aged 21.

Primipara in the sixth month of her pregnancy. Patient's condition was normal until five days ago when she was seized with a severe, sharp, stabbing pain over the right lower quadrant of the abdomen; this condition was increased at the beginning, during, and after urination, and the patient noticed that her urine was cloudy and high-colored; pain and rigidity over the right renal region; had frequent desire to urinate but it caused great pain; slight œdema of the feet; had severe chills in the morning and evening followed by fever and headache; now complains also of pain in the left lower quadrant of the abdomen; vomiting of stomach contents.

Patient was put to bed in the elevated head and trunk position; fluid diet; large amount of water. Bladder was irrigated twice during the day and argyrol injected. Catheterized urine from the bladder was alkaline; there was considerable albumin; loaded with pus; the day following admission to hospital temperature fell to normal, and pulse to 90. The urine was loaded with pus. Improvement was almost immediate, and at no time was the temperature again high; amount of pus in urine gradually decreased, and in thirteen days renal cells began to appear in the urine, but not in sufficient number to indicate any degeneration; the tenderness and rigidity in the renal regions gradually diminished and the patient was discharged at the end of three weeks entirely relieved. The bladder irrigations were given twice daily, using argyrol and silver nitrate, to clear up the cystitis.

REMARKS. In this case it was not deemed necessary to catheterize the ureters, inasmuch as the signs and symptoms were quite positive as to the origin of the pus, and the marked improvement in the patient's condition did not demand irrigation of the pelvis.

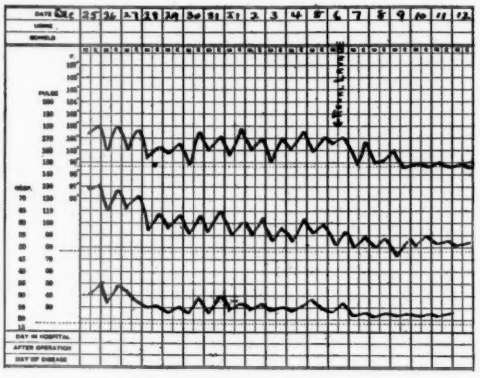
CASE 6. Mrs. Feinberg, aged 30.

Multipara. Patient in ninth month of her pregnancy; previous pregnancies normal.

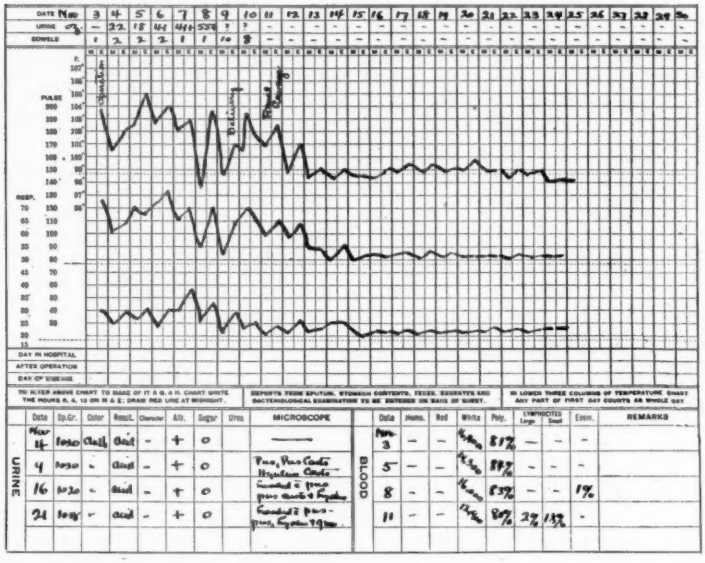
December 21, 1908, patient was seized with a sudden sharp chill and pain in the right side; had repeated chilly sensations followed by high fever; marked frequency of urination and pain upon urination.

Blood examination: Leucocytes 20,500; polymorphonuclears 90 per cent; urine acid; specific gravity 1.016; moderate amount of albumin; no sugar; loaded with pus cells and pus casts; few renal cells; no other evidences of nephritis. Temperature ranged from 99° to 102° every day; pulse from 125 to 90.

January 6, 1909, cystoscopic examination; bladder showed a moderate cystitis; ureters catherized; right kidney pelvis contained four and one-half ounces of residual urine and pus; the first test-tube contained only a small amount of pus, the second test-tube a little more, the third test-tube still more, and the fourth test-tube contained urine loaded with pus; urine from the left kidney was normal in every way. On account of the large amount of residual urine in the pelvis of the right kidney, the catheter was left in place after injecting the pelvis with 25 per cent solution of argyrol; the catheter remained in the ureter for five hours, and at the end of that time the pelvis of the kidney was again



Case 6. Pyelitis of pregnancy. Patient aged 30. Ninth month. Multipara. Renal lavage. Elevated trunk posture. Permanent catheter in ureter for five hours. Recovery.



Case 7. Pyelitis of pregnancy. Patient aged 20. Primipara. Seven months. Complicated by catarrhal appendicitis. Operation. Renal lavage. Elevated trunk posture. Recovery.

irrigated with 25 per cent argyrol solution. Patient was turned on the left side, was postured with head and trunk raised, pelvis lowered, urotropin given, and daily irrigations of the bladder introduced. The following day the temperature became normal and remained so.

Bacterial examination revealed a *gram positive and gram negative bacillus and diplococcus*, varying in size, spore-bearing and fermenting sugar. Patient made an uneventful recovery and left the hospital before the birth of her child.

REMARKS. The patient was treated expectantly for two weeks with the hope that she would not need to have her kidney irrigated; her course is shown in the accompanying temperature chart, as well as the rapid improvement after the renal lavage. It is the first case in which I have found such a large amount of residual urine in the pelvis of the kidney; it is also the first case in which, so far as I know, a permanent catheter has been left for so long a time; when removed, the catheter, which had become molded to correspond to the curves of the ureter, showed the direction of the ureter to have been changed so that it was pushed over further to the right, the extra curve being midway between the pelvic brim and the kidney.

CASE 7. Mrs. Herman, aged 20. Referred by Drs. Duffield and Humpstone.

November 3, 1908, patient was admitted to the hospital; temperature 103.6°, pulse 125; a history of sudden, sharp pain in the right and left inguinal region accompanied by chills and fever; painful urination; she had suffered from slight attacks of pain in this region for the last five years; at present she is in the seventh month of pregnancy; gives a history of slight bleeding from the uterus two months ago.

Urine examination did not reveal the presence of any pus cells; leucocytes 20,000; polymorphonuclear leucocytes 84 per cent. An operation was done by Dr. Duffield and an acutely congested appendix removed, the seat of an acute catarrhal inflammation; during the next five days the patient had a stormy course, temperature ranging from 100° to 105°, patient showing marked symptoms of general sepsis; at this time patient was referred to department of cystoscopy.

Blood examination showed 15,000 leucocytes with 80 per cent polymorphon clear cells.

Urine examination showed acid urine containing many pus cells, a few pus casts and hyaline casts; on that day she aborted, being delivered of a seven months' fœtus that died in twelve hours.

Cystoscopic examination was made and the bladder was found to be the seat of a general cystitis; ureters were catheterized and pus was found in the urine from both kidneys; the pelvis of each kidney was irrigated with 25 per cent solution of argyrol; her temperature became normal on the fourth day after delivery, and she made an uneventful recovery.

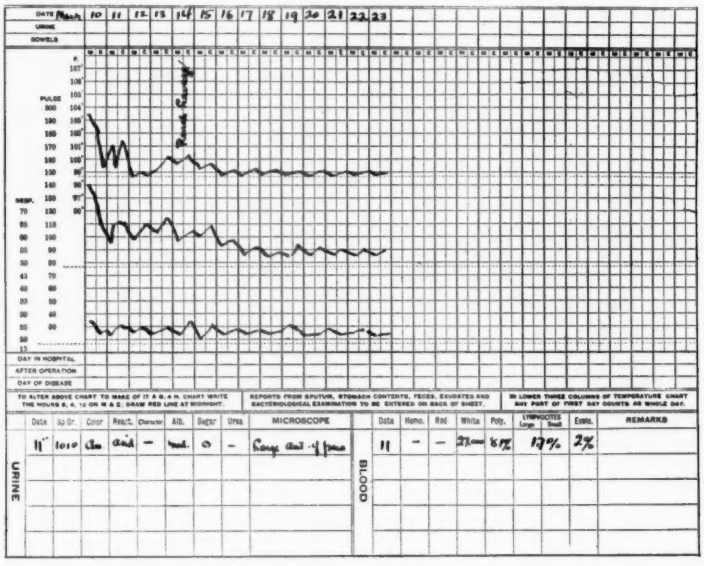
REMARKS. In this case we have a condition of double pyelitis of pregnancy, complicated by an acute catarrhal inflammation of the appendix; it is probably a fact that the original condition was a pyelitis, and if that had been controlled it might not have been necessary to have done the appendectomy and the child might have been saved. At the time of the first examination of the urine no pus was found, and it is probable that at that time the ureter was occluded and no secretion was being expelled from the right side. I believe it is occasionally the case that a diagnosis of appendicitis is made where pyelitis is the real cause of the trouble; in this case there was no question about the existence of an acutely inflamed appendix, but at the same time, the condition of the appendix was not such as to account for the severity of the septic condition.

CASE 8. Mrs. Wilder, aged 26. Case No. 244. Referred by Dr. Leon Louria.

Primipara; at seven months. Eight days ago patient was suddenly taken with a severe chill followed by fever; vomiting; severe pain in the back, more especially on the left side; chills and fever with pain in the left side occurring every night until admission to the hospital; during the day the patient was more comfortable but had no appetite; had to urinate every few minutes in small amounts; some vomiting and suffering from severe headaches.

Examination showed rigidity of the muscles protecting the left kidney; pain referred to left kidney and down over bladder; urine acid; moderate amount of albumin; large amount of pus. It was hoped that a cystoscopic examination would not be necessary. Patient was placed in the elevated head and trunk position, and was given urotropin and bladder irrigations, but the irregular temperature still persisted and she did not improve, so after a few days a cystoscopic examination was done; the bladder was found to be the seat of a general cystitis with slight congestion of the left ureter opening, the urine collected from the left kidney showed a moderate amount of pus; that from the right kidney was normal; slight retention of urine in the pelvis of each kidney, but there was no pus in the right side; each pelvis was irrigated with 25 per cent argyrol solution. Her temperature remained normal and at the end of a week another cystoscopic examination was made, but the conditions of the ureters did not warrant a further irrigation of the pelvis.

REMARKS. At the time of the present report the patient has entirely recovered from her symptoms and her temperature has been normal for nearly two weeks; the bladder irrigations have been continued, and there is still some pus in the urine, but not more than



Case 8. Pyelitis of pregnancy. Patient aged 26. Primipara. Seven months. Renal lavage. Elevated trunk posture. Recovery.

would be accounted for by the amount of cystitis present; otherwise, the patient is entirely well.

CONCLUSIONS

In summing up there are a number of points that I would like to emphasize. Other observers have already laid down rules for diet and the use of urinary antiseptics which are proper to adopt in these cases. Many observers have taught that it was best for the patient frequently to assume the knee-chest posture in order to throw the uterus away from the ureters and relieve the pressure in this way; if my observations are correct, that the pressure of the bladder is more frequently the cause of the obstruction, then this position if assumed would increase the pressure upon the viscus. During the course of cystoscopic examinations I have often observed that when the patient was in the recumbent position the droppings from the ureteral catheter came very slowly, but as soon as the patient was raised up, and especially if she assumed the sitting posture, the droppings increased fifteen to twenty times the number that were previously noted. In one case, particularly, I was able to collect only about two cc. in ten minutes from a diseased kidney, but when I allowed the patient to assume the sitting posture the urine collected at the rate of four cc. a minute. My conclusion from this observation was that there was more to be gained from favoring drainage of the renal pelvis by a position in which the kidney was on a higher level than the bladder, than there was from any fancied relief of pressure on the ureters. Our results and those of a few others who have adopted this method have been very satisfactory.

In a given case it is perfectly safe, should the symptoms not be too severe, to wait for eight or ten days without attempting to catheterize the ureters; if at the end of this time there be a persistent temperature with pain and pyuria, or even without pain, it is indicated to pass a catheter to the pelvis of the affected kidney to drain it thoroughly, and then to instill one dram of 25 per cent argyrol solution. If the same case be examined a week later, the absolute number of pus cells will be very remarkably diminished, showing, beyond question, the effect of this treatment. In a case where there is a large amount of retention in the pelvis of the kidney, with considerable pus present, it is indicated to leave the ureteral catheter in place after washing the pelvis of the kidney, for four or five hours or even longer, repeatedly washing the pelvis of the kidney with some antiseptic lotion.

Abortion, or premature labor, is seldom necessary in this class of cases, but where there is a bilateral involvement with persistent pain and pyuria that does not decrease, and a continuous fever, after trying prescribed methods of treatment, termination of the pregnancy in the interests of the mother is justifiable. This is especially true of cases of infectious origin.

In my own experience I have proven beyond question that in some cases the reaction of the urine in the pelvis of the kidney, in cases of pyelitis, may be alkaline; I believe this depends upon the amount of the retention in the pelvis.

There are many cases of undiscovered kidney disease that are exaggerated during pregnancy, the demands of which would involve operative interference on the kidney before recovery could be hoped for.

It is not necessary to again go over the points which I have tried to bring out in the discussion of each case; I have reported simply my own personal experience, and my deductions are based on complete cystoscopic examinations and careful observations made in a well-equipped hospital.

DEPARTMENT OF TECHNIQUE

THE HARRIS DRESSING FOR FRACTURE OF THE CLAVICLE

By WILLIAM HESSERT, M. D., Chicago, Illinois
Professor of Surgery, Chicago Policlinic; Surgeon to Alexian Brothers and St. Joseph's Hospitals, Chicago

The indications involved in the treatment of fracture of the middle third of the clavicle have been clearly understood since the time of Hippocrates, but it has been found very difficult to embody them in practice, as attested by the seventy different methods mentioned by Gurlt. The dressing varied from a simple sling, to the most complicated appliance. It was usually the case, that the better the coaptation of the fragments, the more intolerable was the dressing to the patient. In fractures of the middle third of the clavicle the inner fragment is drawn upward by the sternomastoid muscle. The rest of the shoulder girdle, namely, the outer fragment with the shoulder and scapula, of their own weight, and by muscular traction, are drawn downward, inward, and forward (Fig. 1).

The vertebral border of the scapula is no longer parallel to the spine, but forms an angle with the sagittal line. On the other hand, the axillary border becomes more nearly sagittal, while the inferior angle is downward, outward, and forward of its normal position. Reduction is to be sought by carrying the shoulder upward, outward, and backward, and any dressing that will retain it in that position with comfort to the patient can be termed efficient. The dressings of Sayre, Velpeau, Desault, and others, while efficient in some cases, are often intolerable.

Dr. M. L. Harris, in September, 1896, published in the *Chicago Medical Recorder*, "A New Dressing for Fracture of the Clavicle." This excellent dressing fulfilled the indications with comfort to the patient and Harris pointed out the importance of restoring the scapula to its normal position. This dressing has not received the recognition in the current text-books that it justly deserves. The writer has used the dressing, with slight modifications, for over five years on many cases with

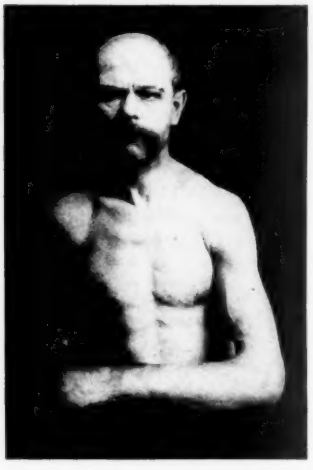


Fig. 1. Fracture of the left clavicle, showing the characteristic attitude of the patient, and the dropping downward, forward, and inward of the shoulder.

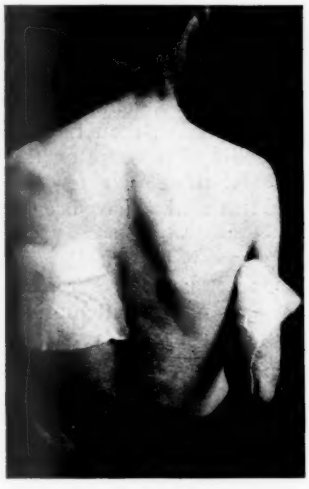


Fig. 2. The adhesive plaster band is applied, showing the lapel under the right armpit.

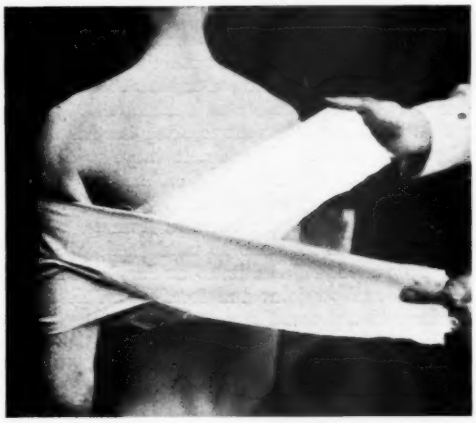
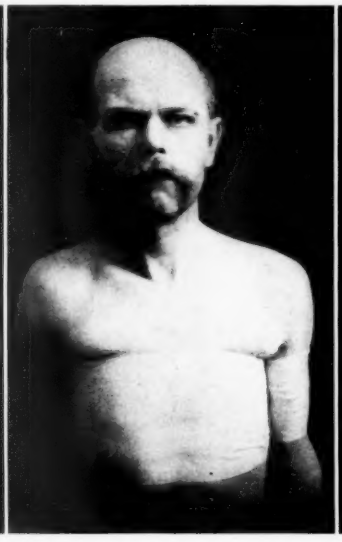


Fig. 3. The four-tailed bandage has been placed around the arm, the tails have been crossed, and traction is being made to ascertain how much pull is necessary to bring the fragments in position, before pinning the tails to the lapel.

excellent results and has found it both efficient and comfortable to wear. The dressing about to be described, while differing in some detail, is practically as described by Dr. Harris in his original paper. While Dr. Harris first used a muslin bandage around the chest, he suggested that a wide strip of adhesive plaster was preferable. As applied to a fracture of the middle of the left clavicle, as in the case illustrated, one proceeds as follows:

Procure a piece of zinc oxide adhesive plaster six or seven inches wide and long enough to reach about two-thirds around the chest. One end is folded over with the adhesive surfaces opposed, to form a sort of lapel. For a fracture of the left clavicle, apply the plaster to the chest (shave if necessary) so as to have the lapel in the right axillary region (Fig. 2). The plaster strip can be adjusted to bring the lapel over the right breast if desired.

The upper edge of plaster should be as high as possible without impinging too much on the axillary folds. This band, besides forming a fixed point to which to fasten the arm dressing, in a measure helps to bring and hold the scapula in its normal position. Then a piece of heavy muslin or light canvas is provided and cut wide enough to reach from the axillary fold to the bend of the elbow without its edge cutting into either. The muslin



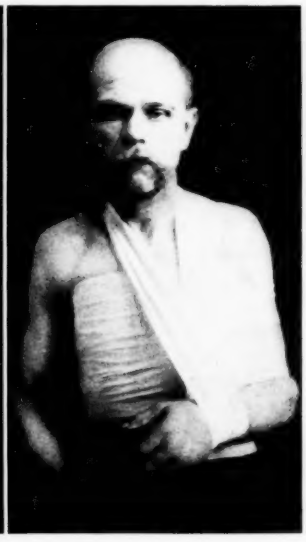


Fig. 4. Fig. 5. Fig. 6.

Fig. 4. The four-tailed bandage has been fastened in place; it is pulling the shoulder backward, outward, and upward, and the scapula is being held in its proper place.

Fig. 5. Front view of Fig. 4. By comparing with Fig. 1 it shows the restoration of the shoulder.

Fig. 6. A muslin bandage has been passed around the chest and arm, by which additional leverage is brought to bear on the shoulder, while tending to force back and hold the scapula in place. Dressing is complete.

can be doubled if necessary. Take a two-yard piece and fold it in the middle. Then take the free ends and tear the material down the center to within a few inches of the folded border.

This makes a four-tailed bandage of the required width folded in the middle. The arm is passed through the fold, so that the untorn portion comes opposite the outer surface of the humerus. All four tails pass behind and around the body in the same direction. By drawing on these the arm is carried backwards and inwards, the scapula upward and inward toward the vertebral column, while the tips of the shoulder, and consequently the outer fragment of the clavicle, are carried upward, outward, and backward into place (Fig. 3). The extent to which the arm should be drawn backward and inward depends entirely on the amount of displacement and deformity to be overcome. The object of tearing the piece into four tails is now readily seen. When the arm is drawn backward in this manner the anterior and outer surfaces are obliquely placed so that were the bandage in one piece when drawn taut it would be making pressure at its upper edge, while its lower edge would be very loose. In passing the four tails around the body they cross so that the two upper become the lower and the two lower the upper. In this way the entire width of the bandage is tight, so that the pressure is uniformly distributed throughout the whole length of the arm. The pressure coming almost entirely on the outer side of the arm, no matter how firmly it is drawn it cannot materially interfere with the circulation." The four tails are continued around the back and pinned to the lapel before mentioned (Fig. 4).

This is usually sufficient to bring the fragments in good position. However, it may be deemed advisable to apply a broad roller bandage around the lower portion of arm and chest (Fig. 6). This exerts still greater outward leverage on the shoulder, and also tends to hold the scapula in proper position. There is no axillary pad necessary. The elbow joint and forearm are free and the latter is supported in a sling. This is a great comfort to the patient, as the elbow can be moved at will without in any way involving the shoulder.

The dressing should be inspected every two or three days, so that if loosened or in any way disarranged it can be readjusted. The seat of the fracture being always accessible to sight and touch, the continued efficiency of the dressing can at all times be controlled. The importance of maintaining a proper reduction of the fragments for the first ten days cannot be too strongly emphasized, as the clavicle unites very quickly and any deformity still present after two weeks can be reduced only with the greatest difficulty. The dressing has been found applicable to both children and adults. In the former it is worn about three weeks, and four in the case of the latter.

A NEW METHOD OF PERFORMING OPERATIONS ON THE SKULL[1]

By WILLIAM HENRY HUDSON, M.D., Atlanta, Georgia

Any new instrument designed for opening the skull must combine simplicity, accuracy, and safety, and these three factors are all secure in the new instruments which I have devised. Although I have demonstrated these before various societies, I find that the principles of their manufacture have been misunderstood and I therefore thought it best to publish in detail the principles of their application. They are built on an entirely new mechanical principle which I have applied to another principle which is very old.

Their peculiarity being that they will cut as long as they need to, but will cease cutting, and cannot be further rotated, when the layer of bone in front of them becomes so thin as to give way before their advance. In other words, as long as there is resistance in the bottom of the opening they will cut; when this resistance ceases, they will not move further. Large drills, trephines, and burrs, have been made upon this principle; but everything has been discarded except burr-like tools.

In making openings into the skull a spiral perforator with a sharp point is first used. This stops cutting just as a fine pin-head-size projection is made on the inside of the skull. Should this be over the groove containing the middle meningeal, the artery would not be injured. The hole is then completed with a spiral burr with a dull center. Both burrs go in under their own pressure; stopping automatically just as the thinnest film of bone is pushed ahead of them. There are

[1] Dr. Keen, in an addendum to Frazier's article, Keen's Surgery, Vol. v, has written a short account of the instruments here described.

two other round burrs for enlarging the holes and for cutting away the external plate as described hereafter and shown in the illustrations.

The forceps, at first sight, suggest the Dahlgren, but are made on an entirely different principle; and are at least many times more efficient than that very useful instrument. The Dahlgren is nothing more than a punch worked by a lever; the forceps here described is a reversed shear, the lower blade transcribing the arc of a large circle, the upper blade transcribing the arc of a smaller circle. Furthermore, should the bone be so thick and hard, though I have never found such a case, that the pieces are not bitten out readily by compressing the handles, the handles may be lifted, thus making the entire length of the forcep an extra leverage.

The holes in the skull can be readily made in ten seconds each, and the channels between them cut with the forceps in about as short a period of time, making it possible to turn down a large osteoplastic flap without any strain or uncertainty, in certainly five minutes, or even less time. I have repeatedly done the bone work where there were six holes made, and the channels completed between them, and the bone flap lifted, in less time than this.

In making an osteoplastic flap with the tools here described, as many holes may be made as is deemed expedient, I generally making six; two at the free border of the flap, being always made at a fixed distance apart, about an inch and a quarter from center to center, so that a Gigli wire saw carrier of fixed curve may be inserted from one hole into the other without impinging upon the brain any further than the thickness of the carrier. This short space is cut out on a broad bevel for the flap to rest upon when replaced. This, I consider very essential in making an osteoplastic flap. The other holes are united with the forceps.

After an immense amount of experimentation I find that this method is far superior in safety and speed, in ease of execution, and certainty, to any power-driven engines, either electrical or hand, besides, having the advantage of great simplicity of construction, and in sterilization. The burrs are driven by a hand brace, with an improved lock which has for use upon the cerebellum an extra joint, which I have termed the *cerebellar attachment.* This lifts the brace away from the head to that extent that the bow of the brace does not strike the shoulder of the patient. There is one condition which must be borne in mind, which I have found once in practice, and that in the case of a negro, the posterior portion of whose skull was more than half an inch thick with a very soft, spongy

Fig. 1. Spiral perforator. To be used first. It makes an opening barely through skull, which is to be finished by the follower, No. 2.

Fig. 2. Dull pointed burr, which I have designated a "follower," for completing opening made by spiral perforator.

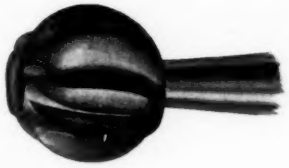


Fig. 3. Burr with large dull center for enlarging any opening for permanent removal of bone, as in decompressions.

There is another round burr smaller than this, with a small dull center, for cutting away external plate of skull as shown in Fig. 5.

diploe. In this case the spiral perforator and the follower stopped in the external plate naturally. In such a case the external plate must be cut away with the smaller of the round burrs, the operation to be completed on the inner plate just as if it were the entire thickness of the skull.

It might be well, as suggested by Dr. Keen, to make the openings in the region of the middle meningeal, last, so that if this artery should be injured, the bone-flap could be quickly lifted and the bleeding stopped; but with the instruments here described, this injury would not take place unless the artery were in a closed canal; and in this condition as the spiral perforater does not make a complete hole, the bone wax would easily stop the bleeding. If six holes are to be made, outlining the osteoplastic flap, they should all be made without changing the spiral perforator. These holes, remember, are not completed, only a pin-head-size projection on the inside of the skull.

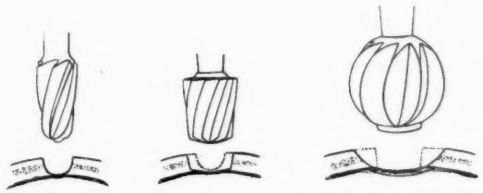


Fig. 4. Showing usual use of spiral perforator and spiral follower to complete the opening; also the use of the large round burr with large dull center should larger opening be needed.

Fig. 6. Showing inside of skull after spiral perforator has stopped, and the opening looking down into it. The completed hole shows thin film of bone at its bottom.

Should these holes bleed a little wax is pushed into them with the finger tip, the spiral perforator changed for the spiral follower, the follower taking up the wax, if any has been used, and the bone shavings, forcing this mass into any bleeding points in the wall of the opening, very effectually stopping all hæmorrhage. In beginning each hole the follower, if the wax has been used, should be cleaned with a piece of gauze, so that the lateral blades will not be interfered with by the deposit of wax and bone shavings between them. It will be noted that these instruments cut better than any instruments heretofore made.

Any one who proposes using these instruments should try them out on the shoulder blade of a two year old ox, leaving the periosteum on the front side to represent the dura; in this bone will be found the thin solid bone, thick bone with soft, spongy center, indeed, all the conditions which may be found in the skull.

All of the tools are self-feeding and do not require pressure, to any great extent, upon the brace. The proper method of making the hole is to apply the instrument to the skull, turn the brace until there is a distinct sensation of stopping; then the perforation is complete unless the diploe is thick and very spongy.

The boring tools. These are superior to others in the following particulars:

They are self-feeding, cutting much faster than any other, whether driven by hand or electricity; stop automatically when through the bone, pushing a thin film of bone ahead of them so the dura is not injured. Without the use of bone wax, or with it, if needed, the wax and bone shavings are forced into the walls of the holes and prevent hæmorrhage from the bone. Any number of holes may be made, as only a few seconds are required to make each hole. Should such a necessity arise the bone work could be done in the dark.

The forceps. The forceps are simple in construction, cheap, and can be entirely sterilized by heat. They shear out distinct bites of bone, and work very rapidly; do not slip whether bone is thick or thin; the entire handle may be used as leverage, if needed; cuts faster and safer than the only other good means, the spiral osteotome.[1] Tends to control bleeding from bone by pressing internal and external plates of bone together. Is not a punch, as is the Dahlgren, but a reversed shear, the points of the upper and lower blades striking into the bone first. The cutting face of the lower blade is wider than the shank so that it can be moved freely in the channel. As the number of holes is not limited, being made so quickly,

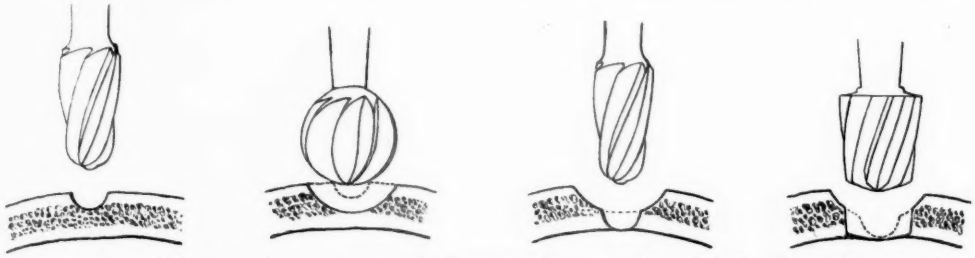


Fig. 5. Shows thick diploe where perforator and follower stop in external plate of skull. The smaller round burr cuts away the external plate and operation is continued on internal plate as if it were only one thickness.

[1] Dr. Chas. H. Frazier uses the spiral osteotome with great skill, and obtains most satisfactory results. He considers the spiral osteotome, however, not an instrument for the untrained. Perhaps the untrained should not use any kind of instrument. I have used the spiral osteotome in twenty brain cases, but have permanently discarded it.

the shank is made wide enough not to break, and the bites are much longer than possible otherwise.

Primarily, all the instruments are hand-driven, a quality absolutely necessary in a surgical instrument. A surgical instrument must be an addition to the surgeon's hand, an extension of it, partaking of his sense of touch and his trained reflexes. This fundamental principle displaces, in my opinion, all power-driven tools, when hand-tools have been perfected.

These instruments require absolute accuracy in their production; and one should be very careful that they are properly made. Should the twist of the lateral blades be too little, or too much, or should the taper of the instruments, or their relative sizes vary, they will fail of their purpose.

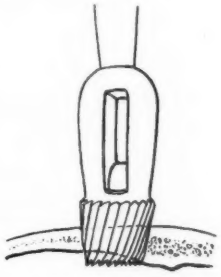


Fig. 7. Showing danger in using even a small trephine where bone changes from thick to thin in a short space.

Recently an acquaintance of mine who understands these instruments informed me that at the recent meeting of the Pennsylvania Medical Association, at Philadelphia, three makes of these instruments were offered for sale, none of which were properly made, and none of which were even safe for the patient.

I therefore have ordered all manufacturers to send each set to me for my personal inspection, with wire for sealing and card for my signature, otherwise I cannot guarantee their quality or accuracy.

The instruments fulfill all needs in every operation on the skull; all shapes of osteoplastic flaps, including the cerebellum; all conditions where the bone is permanently removed, as in decompressions; all simple openings, explorations for hæmorrhage and abscess; brain punctures for drainage of the ventricles; for drainage in basilar fractures and injuries of the brain; for foreign bodies and fractures; for all operations on the intracranial nerves.

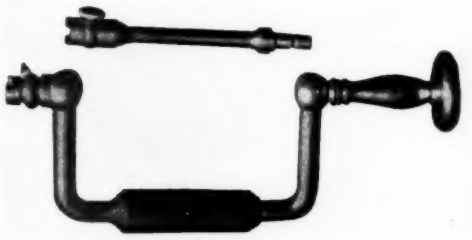


Fig. 8. Hand brace and cerebellar attachment. Hand brace with a larger bow to give smoothness in turning. Cerebellar attachment to lift brace away from shoulder of patient in operations on the cerebellum. The brace, cerebellar attachment, and boring tools have a perfected lock.

Some recent experience has proven the great aid these instruments give in chest operations. As in section of sternum crosswise and lengthwise; section of ribs, especially where large chest flaps are needed. This work will be reported fully later in this journal.

Instead of cutting out large areas of bone with the ordinary forceps, it is better to make the requisite number of small holes, outlining the bone to be removed, and to unite them with the channel cutting forceps.

I wish to emphasize the following: These are the only boring instruments that will cut an infant's skull, all others pushing the skull forwards to a dangerous degree.

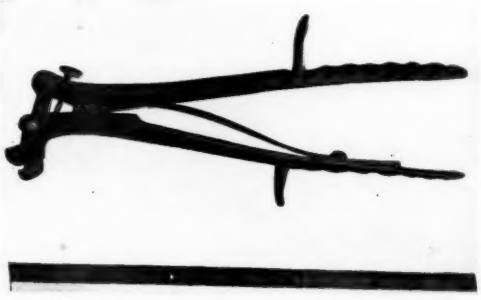


Fig. 9. Forceps of new type. Action that of reversed shear. Does not slip or break, and cuts out a channel $\frac{5}{64}$ inch wide, at about 8 to 10 "bites" to the inch. Entire outlines of the osteoplastic flap can be cut out in from one to two minutes with absolute ease and certainty. The forceps has long leverage and handles, and may be lifted if needed, the rounded front margin of upper blade acting as a fulcrum. Forceps 10¼ inches long.

FIGURE-8 PURSE STRING IN APPENDECTOMY

By FRANK B. WALKER, M. D., Detroit, Michigan

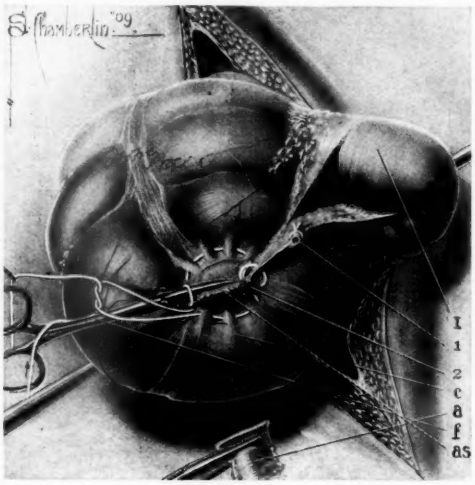
The circular purse string around the stump has been a part of my usual technique for appendectomy since December, 1896. None of my cases have exhibited post-operative hæmorrhage. I have been careful, however, to tie every bleeding point.

When Dr. Wyeth, at Atlantic City, in June, 1907, criticised this method and urged the primitive and crude one of ligation without inversion, I could hardly believe his serious intent, and not until I had known others to have attributed fatalities to the purse string did I consider it inadequate.

Last August, while doing this operation, an unusually troublesome bleeder in the wall of the stump adjacent to the mesentery suggested to me the modification of the circular purse string into a figure-8, as is illustrated in the accompanying drawing. The modified form was used in that case and has since been employed in others with entire satisfaction.

The object of the second loop of the purse string primarily was to ligate the vessel in the wall, which according to Hessert[1] is present in about five per cent of the cases, but it can also be made to roll in the mesentery and thereby cover the triangular space which is otherwise uncovered by peritoneum.

Before inserting it, the appendical artery in the outer portion of the mesoappendix is tied off as usual. Then the suture — catgut — is introduced beginning at the base of the appendix on the side opposite the mesentery, and, passing well under the artery, made to encircle it, grasping the mesoappendix in its course, and finally emerging near the point of beginning. The stump is inverted after the manner of J. E. Cannaday,[2] by grasping part of it with an artery forceps passed underneath an exposed part of the suture, and depressing it by raising the handles of the forceps, after which the purse string is tied as usual, the forceps being loosened and carefully withdrawn. In the act the cæcal opening is closed, all possible hæmorrhage effectually controlled, and the triangular space covered by the inversion of the mesoappendix.



I, ileum; C, cæcum; A, appendix removed; AS, stump of appendix; F, artery forceps; 1, appendical artery; 2, supernumerary vessels present in one in twenty cases.

The drawing represents that stage of the operation when the appendical artery (1) has been tied off, the appendix (A) in the grasp of strong forceps divided, the figure-8 purse string inserted, encircling mural vessel (2) and including mesoappendix, and the forceps (F) in position to invert the stump of the appendix (AS).

[1] Journal American Medical Association, vol. xlvii, p. 2010.
[2] Journal American Medical Association, vol. xlviii p. 1865.

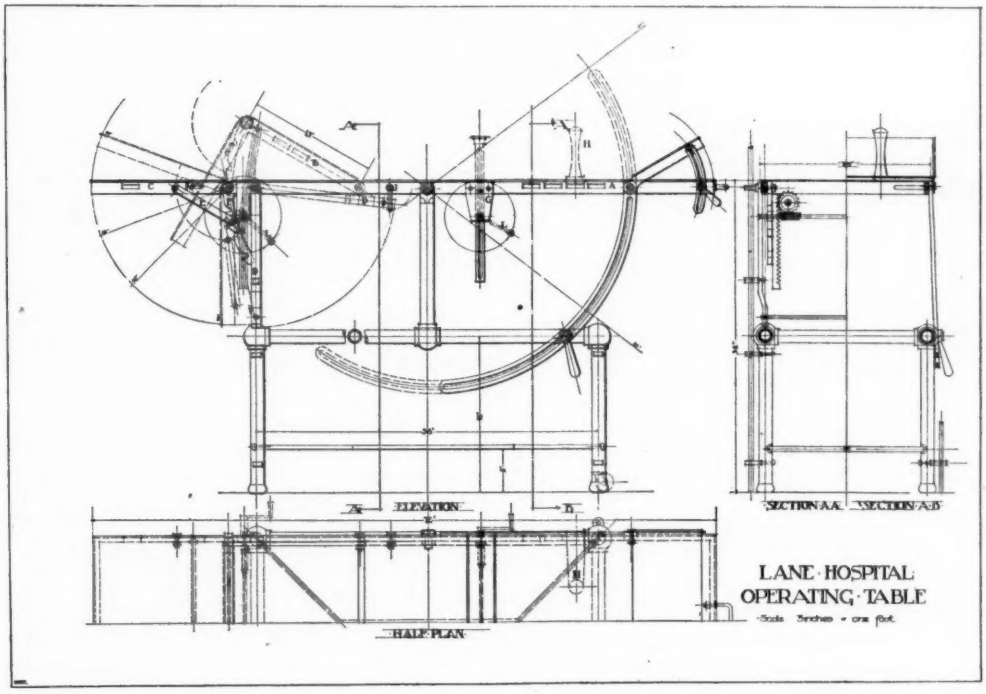
FLEXION OF THE PELVIS IN THE TRENDELENBURG POSITION

By EMMET RIXFORD, M.D., San Francisco, California

Flexion of the pelvis is a most valuable addition to the conventional Trendelenburg position in pelvic surgery. When the average adult person lies on a flat table on his back the pelvis is drawn into the position of extension, causing elevation of the lumbar spine and putting the anterior abdominal wall on the stretch, thereby lessening the capacity of the abdomen and causing a corresponding increase in intra-abdominal pressure. In women especially, with the large hips and small waist, the lordosis is marked. In fat persons this increase in intra-abdominal pressure interferes to a marked degree with the respiration, increasing the work of the diaphragm and oppressing the heart. Many fat persons require the head and shoulders to be raised, as on several pillows, in order to sleep, which arrangement is little more than a means of flexing the lumbar spine.

In the Trendelenburg position with flexion of the knees all these disturbances are intensified; the large buttocks and tapering thighs of the fat person cause an exaggeration of the degree of extension of the pelvis with consequent traction on the rectus muscles; the diaphragm soon tires with the increased labor it is called upon to perform and the abdominal muscles are called into play to aid respiration by producing forced expiration, and thus is brought about the lungeing respiration of fat persons in this position. The increased intra-abdominal pressure is a source of great annoyance to the surgeon because of the greater tendency to prolapsus of the intestines requiring greater quantities of pads and greater force to hold them back, all of which is to the serious disadvantage of the patient.

The difficulties are further increased by greater development of the musculature and are a maximum in heavily muscled fat men. Searching in the belly of such a one for a gunshot or stab wound of the intestines when there has been no



chance to evacuate the bowels, presents difficulties which are well nigh insurmountable short of evisceration — and this is perilous. It is astonishing how much relief is obtained in such cases by flexion of the pelvis to 20° or 30°.

For the last three years the writer has used a table which conveniently provides for flexion of the pelvis when the patient is in the dorsal position or in the Trendelenburg position, and finds the relief given by a few degrees of flexion of the pelvis most comfortable; the anterior abdominal wall is relaxed; the abdominal muscles no longer engage in forced expiration; there is less difficulty in the use of retractors; the intestines have little tendency to prolapse, therefore interfering little with the field of operation, all of which greatly facilitates the general conduct of the operation, makes a very distinct saving of time during which the patient is under the anæsthetic, and very definitely lessens the trauma of the intestines. The respiration is more quiet, causing far less fatigue to the patient. Dr. Caroline Palmer, anæsthetist to Lane Hospital, finds the giving of an anæsthetic to a patient with pelvis flexed a much less anxious procedure than where the ordinary Trendelenburg position is used, especially if the patient be fat.

In these four years' use of the table the writer has noted a singular freedom from backache on the part of the patients after operation. It would seem that what the lumbar spine wants in order not to be set aching after a prolonged operation is not more support, as some have averred, but more relaxation such as is given by flexion of the pelvis. He has therefore grown accustomed to raise the knees slightly in most operations where the patient is required to lie on his back for any considerable length of time.

Of course there is a practical limit beyond which it is not expedient to flex the pelvis in the Trendelenburg position (25° or 30°) because, with greater flexion, work in the depth of the pelvis and especially on the anterior wall must then be performed at an awkward angle — to some extent up-side-down.

Some surgeons have endeavored to overcome the disadvantages of the conventional Trendelenburg position by keeping the legs extended when the table is tilted, holding the patient from sliding by means of shoulder rests. This corrects only a small part of the trouble and has the positive disadvantage of increasing the height of the arterial blood column above the heart, giving that organ more work to do.

Inasmuch as the object of the Trendelenburg position is to facilitate pelvic operations by taking advantage of gravity in keeping the intestines out of the field of operation, much of the benefit of the position is negatived by the interference with the respiration and heart action as described above. With the pelvis flexed to a suitable angle the field of operation can be kept clear of intestines with a considerably less degree of tilting of the table as a whole, which has the advantage of still further lessening the height of the arterial blood column above the heart.

The operating table mentioned and herewith illustrated in improved form is designed to furnish the surgeon a table which, while strong and rigid, is capable of a number of adjustments commonly found of convenience in general operative work. It may be looked upon as a development from the Baldwin table, which is deservedly one of the most popular designs of operating tables in use in American hospitals.

Its distinguishing features are the following:

1. It may be tipped with head up or down to an angle of about 35° by the anæsthetizer in a moment.

2. The thigh and leg portions (B and C) of the table are fitted on an inner frame (B) which may be tilted independently by a worm gear and ratchet so that the pelvis may be flexed through an angle up to 30°, when the patient is in the dorsal position or in the Trendelenburg position.

3. When the patient is in the lithotomy position the leg section (C) or apron as it is sometimes called, is flexed to a right angle or even more (102°), thereby being placed well out of the way of the operator's knees.

4. When a particularly rigid table is desired, as in much orthopedic work, two swinging legs (D) may be dropped into a vertical position into sockets as shown and the table clamped down by means of the arc and friction clamps. When not in use the legs are simply swung up by rings (J).

5. The rack (F) is strong and is a continuation of the inner frame (B) and the brace (E) which engages in it permits the leg section (C) to be tilted to various angles as shown on the drawing.

6. The shoulder rest is of simple construction and is put into place by simply pushing its under strap into one or other of the sockets shown in the main frame, according to the stature of the patient. When the table is tilted elevating the patient's head, the shoulder rests may be used in the axillæ to prevent the patient from sliding down in the opposite direction, or, to avoid the danger of compression of the axillary nerves in prolonged operations, the shoulder rests may be placed in suitable slots in the leg section of the table or apron and a piece of board laid across them for a foot rest.

7. For operative work on the front of the neck (goiter, epithelioma, tuberculous glands, etc.) the head of the patient may be placed on the so-called leg section (C), which is dropped for the purpose to an angle determined by the required degree of retraction, the shoulders resting on the thigh section (B), which may be raised by means of the worm gear as desired. The shoulder rests placed in the sockets of the thigh section (B) and in the axillæ of the patient will prevent him from slipping down though seldom necessary because the remainder of the table would ordinarily remain horizontal.

Dimensions. The table is 6 feet long, 20 inches wide, and 36 inches high (most operating tables on the market are too low).

The accompanying drawing is made accurately to scale. The frame is purposely made heavy and strong; the main frame (A, B, and C) is of steel, ½ x 1½ inches. The top is of plain or nickeled brass and ⅛ inch or more thick, with rounded edges and corners.

The worm gears, which should be enclosed, have been used sufficiently on other tables to show that they are much more convenient than any ratchet and pawl arrangement or simple wheel and ratchet, for the nuisance of the pawl is done away with, the friction with the reduction of speed furnishing sufficient stability; besides they admit of much finer adjustment. Similar worm gears are employed in operating the loin elevator which is used in kidney and gall-bladder work. The crank is of course detachable.

SALINE PROCTOCLYSIS APPARATUS

With the Description of the Apparatus as Used in Dr. J. B. Murphy's Clinic

By PAUL B. MAGNUSON, M. D., Chicago, Illinois

The Murphy treatment of peritonitis, since its inception, has given such uniformly satisfactory results and has so greatly reduced the death rate in this much-feared infection, that it seems not only justifiable but urgent to introduce an apparatus by which this treatment can easily be carried out in general as well as hospital practice.

The faults with the present forms of apparatus for administering continuous saline are: First, complexity of parts; second, bulkiness; and third, impractibility of the electric-heated variety, except in rooms supplied by electricity.

The apparatus which we wish to here call attention is very simple. It consists of a vacuum bottle, a combination stand and holder, and a tube of various parts leading from the bottle to the rectal terminus.

The tube is the only part of the apparatus which needs a description. It consists of an air intake tube (G) of glass which extends from the cork to the bottom of the bottle, since it is necessary to invert the bottle, it being impossible to fit a stopcock into the bottom of this variety of reservoir. This air intake tube is connected by rubber tubing to the regurgitation funnel (D), so that regurgitated fluid from the rectum will flow back into the bottle, thus preventing the soiling of bed linen. From the cork, extending in the opposite direction, is the outlet tube of glass (H), connected to the glass dropper bulb (E) below by thick gum rubber tubing. This bulb dropper consists of a small glass tube inserted into a bulb, and enables the nurse to observe the inflow of the solution and control it accurately by a screw clamp (F) on the rubber tube just above the bulb.

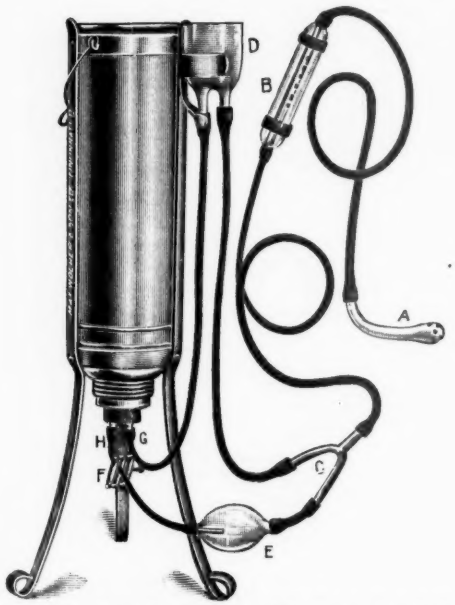
The solution runs from this bulb through another rubber tube to connect with a Y tube (C) below.

One arm of the Y is connected with the outlet, and one with a tube leading upward and ending in a small galss funnel (D) attached to the side of the stand. This tube and funnel act as an outlet for regurgitating fluids and gases, in case the rectum becomes too much distended, and the overflow, as before stated, returns into the bottle.

About nine inches below the tube is a bulb containing a thermometer (B) which is marked in .5 of a degree in plain figures from 90° F. to 120° F. This enables us to tell accurately at what temperature the saline solution is entering the rectum. The rectal tube (A) is made of glass with five perforations one-eighth of an inch in diameter, at its bulbed end, and bent about four inches from the end at almost a right angle. This variety of tube is much more satisfactory than rubber.

A flannel sleeve covers the entire length of glass and tubing, thus retaining heat as the fluid passes through.

The salines are put into the bottle at 140° F.,



the stand slipped over the bottle, the cork put in, and the whole inverted and either placed on a table beside the bed or hung by a hook-rod clamped to the side of the bed.

This is such a valuable, simple, and easy method of treatment in all toxemias, cholemia, stercoremia, septic intoxication, as scarlatina, diabetes, as well as peritonitis, that with an apparatus of this kind much better results should be obtained in the future than in the past. Solutions may be made up in one's office and carried for hours in the corked vacuum bottle and still be at the right temperature when needed. This should appeal to country practitioners, not only for proctoclysis, but for sterile intravenous injections in cases of emergency, where the solution may be kept on hand and ready for use in an instant.

It might not be inappropriate to mention Dr. Murphy's methods, since they have been much misunderstood or carelessly followed, with the result that a very valuable therapeutic measure has been much maligned, not through any fault of its own, but through the ignorance or carelessness of those who did not properly administer it and failed to get "results." Out of fifty-eight consecutive cases of general perforative, suppurative peritonitis treated by Dr. Murphy only two deaths resulted; that is, about three and one-half per cent, instead of eighty to ninety per cent, as formerly occurred.

"First. Fowler position exaggerated at all times from the moment diagnosis is made.

"Second. Withhold all food.

"Third. As soon as the patient is returned to bed after operation, proctoclysis is instituted and maintained until the serious symptoms of intoxication cease. The continuous method is by far the most scientific and successful. Moderate distention is the normal condition of the large intestine. If it is hyperdistended it causes spasm and expulsion of material. The mucosa of the large intestine absorbs water with great rapidity. The retention of fluid in the colon depends entirely upon the method of its administration. We have visited hospitals numbers of times and have been shown patients who were receiving the "Murphy treatment." We should not have recognized it without the label. It is difficult to impress those administering it with the importance of details, notwithstanding that the best results are secured only by close attention to detail. A fountain syringe, to which is attached a three-eighths-inch rubber hose fitted with a hard rubber or glass vaginal douche tip with multiple openings was the medium originally used by Dr. Murphy. This tube should be flexed almost to right angles three inches from its tip. A straight tube must not be used, as the tip produces pressure on the posterior wall of the rectum when the patient is in the Fowler position. The tube is inserted into the rectum on the flexion angle and secured in place by adhesive strips binding it to the side of the thigh so that it cannot come out; the rubber tubing is passed under the bedding to the head or foot of the bed to which the fountain is attached. It should be suspended from six to fourteen inches above the level of the buttocks and raised or lowered to just overbalance hydrostatically the intraabdominal pressure, i. e., it must be just high enough to require from forty to sixty minutes for one and one-half pints to flow in, the usual quantity given every two hours. The flow must be controlled by gravity alone and never by a forceps or constriction on the tube, so that when the patient endeavors to void flatus or strain, the fluid can rapidly flow back into the can, otherwise it will be discharged in the bed. It is this ease of flow to and from the bowel that insures against over-distention and expulsion onto the linen.

"The fountain had better be a glass or graded can, so that the flow can be estimated. The temperature of the water in the fountain can be maintained at 100° by encasement in hot-water bags. The fountain is refilled every two hours with one and one-half to two pints of solution.

The tube should not be removed from the rectum for two or three days, except for bowel movement. When the nurse complains that the solution is not being retained it is certain it is not being properly given; even children tolerate proctoclysis surprisingly well. We have administered as much as thirty parts of salt solution in twenty-four hours, and it was all retained. We believe that, next to the conservative technique of the operative procedure, proctoclysis is second in importance as a life-saver. It rapidly restores blood pressure, it improves the capillary circulation, it quiets the thirst, it eliminates the septic products and increases the excretions. All of the details are simple, but they must be carried out with precision to secure the best results. If the patient has a tendency to vomit, is nauseated, or shows evidence of gastrectasis, lavage should be practiced and repeated often if the stomach refills with fluid."

From "Perforative Peritonitis, General, Free, Suppurative," by J. B. Murphy, Surgery, Gynecology and Obstetrics, June, 1908.

ANÆSTHESIA IN OBSTETRIC PRACTICE

By HERBERT MARION STOWE, M. D., Chicago, Illinois
Associate in Obstetrics, Northwestern University Medical School

When, after the discovery of ether as a means of producing general anæsthesia, several surgical operations had been successfully performed under its beneficent influence, Sir James Y. Simpson was the first to introduce this agent into the practice of obstetrics, by performing a version and extraction on January 19, 1847. Ether was first used in this country by Dr. N. C. Keep on April 7, 1847, in a normal labor, with satisfactory results. Upon the discovery of chloroform by Simpson and its first trial by him on November 8, 1847, the use of ether was discontinued by the profession. Simpson recommended chloroform as being "more speedy and perfect in its action, more agreeable in flavor, less irritating in its administration, and more transient in its effect."

From the time of Simpson, chloroform has been preferred to ether in obstetric practice by the great majority of obstetricians and physicians in general, for the reasons advanced by its discoverer. This practice is general at the present time. However, various fatalities and scientific investigations of the results produced by chloroform narcosis have cast serious doubts upon the alleged superiority of chloroform over ether. It is a well known fact that chloroform is much more dangerous as a general anæsthetic than is ether in surgical operations, and for this reason surgeons prefer ether when pulmonary complications are absent. The same rule should apply in obstetric practice, for both normal and operative deliveries are of necessity surgical proceedings.

The comparative effects of ether and chloroform upon the uterine contractions are somewhat similar. Both lower the intrauterine pressure in obstetric narcosis. In surgical anæsthesia, the uterus under chloroform is paralyzed, or its contractions become very weak and the intervals long. Under ether, the intrauterine pressure is decreased in lesser degree and the interval is lengthened accordingly. The patient recovers quickly from chloroform anæsthesia more quickly and it becomes necessary to administer more of the drug to prolong the narcosis. Under ether, on the other hand, the patient awakes to consciousness more gradually and it is possible to suture a lacerated perineum or cervix without resorting to more anæsthetic — a valuable point in favor of ether. The uterus recovers from the ether anæsthetic, according to Hensen, in from five to twenty minutes, and from chloroform narcosis in from one to two hours. The danger of post-partum hæmorrhage after chloroform is a well-recognized fact, and its explanation is found in the effect of chloroform upon the uterine ganglia and musculature. Undoubtedly, many cases of serious and fatal hæmorrhage have occurred from uterine atony as an indirect result of the anæsthetic.

Recently, several investigations have been made concerning the cause of death after chloroform narcosis. As a result of these studies, it has been determined that chloroform produces a condition of hepatic toxæmia similar to that of phosphorus poisoning. The symptoms make their appearance in 10 to 150 hours after the withdrawal of the anæsthetic. The symptom-complex consists of vomiting, restlessness, icterus, cyanosis, and Cheyne-Stokes respiration. Bevan and Favill state that chloroform especially, ether to a slight extent, produces a destructive effect upon the liver, kidneys, cardiac muscle, and other muscles of the body, resulting in fatty degeneration and necrosis. The chief lesions are localized in the liver cells. Their

synthetic function is destroyed. Autolysis of the cells follows with resulting alteration in the liver structure. The various products of autolysis — amido and other organic acids — are detected in the blood and urine. Wells believes that it is probable that the oxidizing enzymes are particularly involved and account for the marked fatty changes that are present in this condition. The hepatic lesions are in direct proportion to the amount of anæsthetic given and the duration of its administration.

As is well known, the liver is the central organ of metabolism, and its cells constantly transform injurious and irritative material into comparatively harmless substances, until they can be eliminated from the system. Should the hepatic cells be limited in their functions, toxins will be formed that are certain to exert a pernicious influence upon the organism in general. If the vital powers are lowered by certain constitutional dyscrasias, as diabetes, diphtheria, sepsis, and wasting diseases, hepatic autolysis is prone to occur.

Pregnancy exerts a profound impression upon the maternal organism in general and the liver in particular. Every pregnant woman is toxæmic and no liver is able to do its full duty during gestation. The extra burden of eliminating the excreta of the mature fœtus from the mother after a continuous strain of eight or nine months necessarily produces certain changes in the liver cells. When liver insufficiency is marked and the patient dies from pernicious vomiting, eclampsia, or acute yellow atrophy of the liver, the pathologic changes are nearly identical with those following death from chloroform poisoning.

The administration of chloroform at the time of labor tends to increase those pathologic changes in the liver — fatty degeneration and necrosis — heart, kidneys, and muscles generally that when sufficiently pronounced lead to the post-mortem picture of eclampsia and acute yellow atrophy, by compelling the weakened liver cells to synthesize the destructive and irritative products carried in the blood. If the hepatic cells are unable to perform this function, they are themselves acted upon by the products and undergo fatty degeneration and necrosis with serious results to the patient.

It may be possible that the free use of chloroform in eclampsia determines a fatal termination in those cases where the patient suffers from convulsions after delivery, or where the coma deepens and is accompanied by a steady decrease in the excretion of urine. From our present light, at least, the pathologic effects of chloroform narcosis add to the lesions produced by the eclamptic condition. If this theory is true, the choice of an anæsthetic in the borderline cases will determine the ultimate outcome of the disease.

The poisonous effects of anæsthetics in labor depend primarily upon the quantity given and the length of the narcosis. General anæsthesia should not be administered during the first stage, because of its liability to prolong the period of dilatation and increase the danger of fœtal asphyxia. During the second stage, ether may be administered in small doses until the acuteness of the pains is overcome. As the fœtal head becomes visible at the pelvic outlet, the anæsthesia can be increased so that the delivery can be accomplished without conscious pain.

If an operative delivery is necessary, ether should be used on all occasions unless pulmonary complications are present. The relative safety of this anæsthetic as compared with chloroform should outweigh all its lesser disadvantages.

While various appliances are recommended for the administration of ether, a simple and efficient contrivance consists of two rectangular pieces of cardboard enveloped in a towel so as to form a cone which fits the face snugly. The apparatus is similar to a book cover with the short ends secured by safety pins. Several small pieces of gauze are placed within to retain the ether. During normal labor, when slight anæsthesia only is indicated, the open method is preferred. The ether is well mixed with air, and toxic effects are extremely rare. Care should be taken to remove all foreign bodies from the mouth and secretions from the nasal passages. For the obstetrical degree of ether anæsthesia, the mask may be held by the nurse, physician, or patient herself. A few drops are given at the onset of each contraction. When the required degree of anæsthesia is obtained, little more need be added. It is impossible to induce surgical anæsthesia by this method.

For operative deliveries, the anæsthetic should always be given by a physician if possible. The ether cone is applied to the oiled face and a towel folded around it to exclude the air. The ether is then poured into the cone at the back. The quantity of air inspired can be regulated by opening or closing the back of the cone.

One of the greatest objections to ether is the vomiting. During delivery, vomiting is caused by the swallowing of mucus impregnated with ether fumes. Sufficient ether should be given to prevent vomiting at this time. Vomiting after delivery is concluded is more frequent after ether, but is more transient and less apt to recur. Patton states that severe and prolonged vomiting is more common after chloroform.

Much can be done to prevent vomiting and by

careful preparation of the patient and the judicious administration of the anæsthetic, vomiting will be the exception rather than the rule. We should use as little of the anæsthetic as possible. By the open method, few patients suffer from vomiting. If the patient has swallowed much mucus, this may be removed from the stomach by a pump while she is unconscious. If the patient vomits after the return to consciousness, she may drink a quantity of hot water, and as this is ejected, much of the mucus will be removed and the patient is relieved. The patient should lie on the side with the face down so that mucus or ejected material can be removed from the mouth and throat. She should be moved as little as possible, as vomiting is frequently increased by motion. Many patients are unduly exposed in obstetric operations, and these are liable to contract pulmonary complications. The body temperature after delivery should be maintained by artificial means, especially if the vital powers are depressed.

The great danger of ether pneumonia has been urged as a contraindication to this form of anæsthesia. Owing to its irritant action on the respiratory organs, ether should not be given in inflammation of these tissues. Prescott of Boston found three cases of ether pneumonia in 46,000 anæsthetics, while Silk of London saw thirteen in 5,000 cases. Gurlt of Berlin collected thirty cases in 52,177 cases. Other writers give a higher percentage. We may state, therefore, that ether pneumonia is the rare exception, and when given by competent men can be practically excluded from the list of accidents.

The mortality statistics are largely in favor of ether. The combined reports of Gurlt of Berlin, and Juillard of Geneva, give 341,058 ether anæsthetics, with twenty-three deaths, while the report of the Committee of the British Medical Association (1900) gave 4,595 cases with six deaths, and none due solely to the anæsthetic. On the other hand, Gurlt and Juillard collected 691,329 chloroform administrations and found 224 deaths.

CONCLUSIONS

1. Ether should be used as an anæsthetic in obstetric practice when pulmonary complications are absent.

2. Its action upon the uterine contractions in the second stage of labor is preferable to that of chloroform.

3. No anæsthetic should be given in the first stage of normal labor.

4. Uterine atony and post-partum hæmorrhage are rare following ether anæsthesia.

5. Ether should be used in eclampsia in preference to chloroform. Its action is as positive and the danger much less.

6. Ether is far safer to the mother than chloroform. The danger of delayed poisoning is rare.

7. The indication for the use of chloroform in obstetric practice will be greatly limited in the future, when its toxic effects upon the vital organs are better understood.

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

REGULAR MEETING HELD DECEMBER 3, 1909, WITH THE PRESIDENT, DR. ARTHUR DEAN BEVAN IN THE CHAIR

GUTTA-PERCHA TISSUE IN SURGERY

BY JACOB FRANK, M. D.

Dr. Jacob Frank gave a short history of gutta-percha, which was first brought to the notice of western civilization in 1656; to be re-introduced in 1843 by Dr. William Montgomery, English resident physician at Singapore. A report by a commission appointed by the Academy of Medicine, Paris, in 1849, to investigate the value of gutta-percha instruments was reviewed. Dr. Frank called attention to the fact that gutta-percha tissue can be successfully used for more purposes than any other one material employed by the surgeon. That the well-known cigarette drain was but an item in the many uses that could be made of it. Modification of the cigarette drain and their various uses were explained and discussed. The value of the gutta-percha tissue spiral as an aid to repair of tissues, as well as a decided addition to the comfort of the patient, was shown. Of especial value was the result of bacteriological experiments which were carried out to demonstrate means of sterilizing this tissue. These experiments showed that neither carbolic acid, lysol, or alcohol killed the various organisms employed in the experiments; but that a chloride of mercury solution, one to one thousand, effectually killed both spore and non-spore producing bacteria in twenty-four hours, while in no way injuring the gutta-percha tissue.

DISCUSSION

DR. E. W. ANDREWS: I am interested in the test of antiseptics in preparing gutta-percha. It shows that 50 per cent alcohol had far more antiseptic power than the concentrated 95 or 97 per cent, and that the phenol solution of full saturated strength, that is to say, 5 per cent, was not absolutely antiseptic.

I think we all remember that gutta-percha was exclusively used years ago in surgery. I saw a great deal of it used in sheet form such as dentists employed in their work. They used the ordinary red colored sheet pure gum, tinted red or pink. It was about two millimeters in thickness. Gutta-percha gum can be strongly contrasted with any other similar material, in that it is perfectly soluble in certain solvents, such as bisulphide of carbon, acetone, etc., and other agents. It is inelastic and plastic. It can be softened by one of the solvents, so as to be useful as a coating or varnish for skin surfaces. Unlike rubber, it can be dissolved and also can be softened by mild heat. These sheets that I speak of are of the thickness of light pasteboard, and have a marked rigidity when cold. They are almost as rigid as fairly strong mill-board or pasteboard. It only requires a temperature a little above body heat, say 120° F., to make them soft and plastic, so that the sheets are beautifully adapted to the making of small splints for the hands and fingers.

The best use I have ever seen for gutta-percha tissue is for drains. We have substituted these almost altogether for gauze strips in a form like tapers or "lamp-lighters," making the strips long and narrow by folding the tissue two or three times. A bundle of such "lamp-lighters" will form a better drain in the abdominal cavity than gauze strips. You have probably all seen a bundle of gauze strips taken out with pain and difficulty. Unlike the latter, these gutta-percha tissue strips do not form adhesions to the viscera. They drain fully as well as gauze strips. After a day or so gauze strips cease to drain. They become non-porous. This is not so with gutta-percha tissue strips, and it seems the thicker the fluid, or the more coagulant it is, the less the gutta-percha tissue strips become agglutinated. Nothing sticks to them. They continue to drain for a long time. One fault they have is their frail texture. I remember once breaking one of them off in an attempt to pull it out. Gutta-percha tissue tears and stretches very easily. It is not much stronger than paper. I broke off one of these in the

abdomen after an operation, but was greatly relieved a day or two later, after taking out a deep stitch, to be able to fish it out with forceps. If I had not, it would have prolonged the suppurative condition.

DR. D. W. GRAHAM: I do not use the gutta-percha tissue as much as formerly. In hospital practice paraffine paper is a good substitute and much cheaper. I refer to the use of crude gutta-percha which I have used with great satisfaction in fractures of the jaw. Immersed in hot water for a few minutes this material becomes soft like putty, and can be easily and quickly shaped by pressure into an interdental splint which will be quite as efficient though not as artistic in appearance as that which a dentist would make.

If one must use protective strips for Thiersch skin grafts the gutta-percha tissue is probably the best material. But I have not used the protective strips in skin grafting for a long time, for I am satisfied they are worse than useless. So with the salt solution and the wet dressings. The grafts when placed on a clean recent wound are covered with simple, flat, sterile dry gauze which is not renewed for eight or ten days, when the grafts will be found firmly grown to the surface beneath. The surface from which the grafts are taken is dressed exactly in the same way and the dressing not removed until new epidermis has formed, eight or ten days later. When the grafts are placed on a granulating surface, there will be less suppuration and fewer grafts lost by using the same sterile dry gauze without the protective strips than with them. But in this kind of case the dressings should be changed every two, three, or four days, according to the amount of pus one expects from the granulating surface. In changing these dressings the grafts can be left undisturbed with a little extra time and care, quite as well as if protective strips had been used.

DR. ARTHUR DEAN BEVAN: Dr. Frank's paper is very timely. About ten years ago I remember seeing the greatest master in surgical technique I have ever seen — Dr. Charles McBurney — use gutta-percha tissue for drainage, and from that time on I have adopted it, practically discarding tubular drainage entirely in surgical work, with the exception of some special cases. The use of gutta-percha tissue in the form of cigarette drains, and spirals and strips has practically revolutionized the whole subject of drainage within the past few years, and gutta-percha tissue can be very thoroughly sterilized by bichloride solution, as Dr. Frank has said. In our hospital it is our custom to have the gutta-percha sheets in bichloride solution for weeks at a time, and we have never had any trouble with it. It is non-irritating, is not likely to produce pressure necrosis, and in our clinic, even in amputations of the thigh, instead of using the old fashioned tubular drain, a little sheet of gutta-percha is folded up and tucked in the lower angle of the wound, and is not removed until the end of ten days. It is not removed, as a rule, until the stitches are removed, and it certainly answers better for the purpose of drainage than any other substance we have ever employed. The same thing can be said with reference to goiter work, and of all neck work in general. I have seen one fatal case from a drainage tube used in the neck. I do not think a drainage tube should ever be used in the surgery of the neck, on account of the danger of pressure necrosis. Gutta-percha tissue offers the very best drainage material.

DR. FRANK (closing the discussion): I wish to make a few remarks with reference to the use of dry gauze on grafts and granulating surfaces. I used dry gauze in that manner before I adopted the use of gutta-percha tissue. Formerly, when I applied dry dressings on granulating surfaces I knew very well, before I got to the hospital, what would happen when I began to remove the gauze from the raw surface. The patients would cry and yell in pulling off the dry gauze from the granulating surface. It is not only very painful to the patient, but it is distressing to the surgeon to hear the piteous appeals of these patients when we are pulling it off. Another reason why I discarded the use of dry gauze on granulating surfaces is that we cannot remove it without opening up new foci of infection, because it will stick.

If Dr. Graham will try gutta-percha tissue on raw surfaces he will like it, and I am sure his patients will. There is nothing more painful than to remove dry gauze when it becomes adherent to a granulating wound.

DR. CARL BECK read a paper entitled "Osteomyelitis and Its Treatment." (See p. 113.)

DISCUSSION

DR. A. J. OCHSNER: This is certainly one of the most instructive demonstrations we have had before this society. We have given very little attention in this society to osteomyelitis, and still it is a most practical subject, and should be thoroughly discussed. The importance of this demonstration lies in the fact that Dr. Beck has impressed us with the possibilities — as well as with the necessity — of a definite diagnosis. This method of diagnosing cases of chronic osteomyelitis is most effective.

As regards the operation itself, the illustrations show that some of the older methods, particularly

the one introduced by Schede, and the one by Prof. Senn, are better than those which have been practiced in these cases. Let us take the case of osteomyelitis of the femur, in which we have a sequestrum occupying the lower third of the shaft of the bone. One of the important things Dr. Beck has shown us is that he can determine whether the dead bone is in the upper or lower portion, or the outer or inner side of the bone. No matter in what location the dead bone may be, I believe that one is likely to leave small portions of sequestra, as was very evident by these skiagrams, unless one has previously determined the exact location of each portion of the sequestrum and unless one makes an extensive exposure. The use of Beck's paste is an advantage over the use of decalcified bone and over the Schede blood clot in the treatment of the cavities left after removal of sequestra.

With regard to early operation, from what Dr. Beck has told us, one might suppose that in case the shaft of the bone of the humerus, for instance, were virtually destroyed early during the progress of the disease, then it should be removed, but that would be conveying a wrong impression. Some fifteen years ago a number of surgeons regularly removed the entire shaft in acute osteomyelitis whenever it seemed to be dead. As a result of this practice there were many deformed legs and arms. Even two years ago I saw a noted surgeon in the southern part of this country demonstrate a number of such cases in his clinic. The legs of these patients were absolutely useless. Unsuccessful attempts were made to repair the condition by implanting portions of bone from amputations, etc. If the incision had been made through the periosteum down to the bone, the greatest portion of the shaft of the tibia, for instance, would have been entirely restored, and only small portions would have become sequestrated and would have required removal.

The sequestrum can be readily removed six months later when the involucrum is sufficiently strong to support the weight of the body.

Dr. D. W. Graham: We know that the pus in some of these cases of osteomyelitis is very close to the joints. In the lower end of the femur, we know that the onset and activity of the disease is just above the epiphyseal cartilage. That is pretty close to the joint, and pus not infrequently burrows all around the periosteum. If we go through in front we are almost certain to open into the bursa that is under the quadriceps tendon. In many cases we would do this, and probably cause infection of the knee-joint, for this bursa often directly communicates with the joint. For this reason, if for no other, I think the anterior incision objectionable. If we open above the bursa we are too high to get at most of the pus, in the early acute cases, and if we are operating to remove sequestra and carious spongy bone near the epiphyseal cartilage, we are too high to permit a complete removal.

Dr. W. R. Cubbins: There is one thing that occurred to me which skiagrams might not show clearly, and that is in the case of a heavy man who has used the limb constantly and developed a very heavy involucrum.

I have had two cases of sequestra. In one, the dead bone was shown perfectly by a skiagram and the piece removed without difficulty. This, however, was in a slight man who had not used his limb very much. In the next one it was a heavy man whose osteomyelitis had existed for forty-six years. In this case there was such a marked sclerosing osteitis that the cavity containing the sequestra or sequestrum was not visible. The shell of bone was at least three-quarters of an inch thick. I would like to know if the doctor has seen a case of this type.

Dr. E. W. Andrews: This paper is full of new and interesting data. We ought to spend considerable time in discussing it. One thing new to me is the median incision to reach the femur through the center of the quadriceps muscle and tendon. It looks good to me. I have always practiced the outer incision, sometimes of necessity going pretty nearly the whole length of the bone from knee to hip. I had supposed that the inner aspect was too dangerous on account of the vessels there, Hunter's canal and nerves. I had also thought the posterior incision was dangerous on account of getting too near vessels and the popliteal space. Certainly, the outer region does not let us in between two muscles. We find that the vastus externus spreads out fanlike, and before there is any uncovering of the shaft we cut a lot of muscle fibers transversely. If we can get the bone laid bare without cutting muscle tissue, but only splitting it, the advantages described appeal to me very strongly.

Dr. Daniel N. Eisendrath: I do not understand one point which Dr. Beck has made. In the skiagrams which he has shown us the light areas look like abscess cavities, and he has called them sequestra. Undoubtedly he means the darker shadow showing the sequestrum.

Dr. M. L. Harris: This is a very valuable presentation by Dr. Beck, and from it two or three valuable lessons may be drawn. The first is that the operating surgeon should be the one to interpret the X-ray picture. The value of the X-ray picture depends entirely on the interpretation,

and the one who takes the picture with him to the operating room, and is constantly comparing it with the conditions found, is the best interpreter of the picture. The second lesson is that the success of operating on osteomyelitis consists in removing all of the diseased process, and as these X-ray pictures have shown us repeatedly to-night, this is only possible in some cases, in fact, in many cases, by a careful study of the X-ray pictures, so as to be able to locate all of the diseased area before the operation is made.

DR. BECK (closing): With reference to the question asked by Dr. Cubbins: I saw one case in which the bone was so dense that there was no spongiosa present. In chiseling, the instrument cut through sclerotic tissue. The condition had existed for many years. While we overlooked the cavities in the first picture, in the second picture, taken shortly afterwards, three cavities could be seen. I spoke of that case during the demonstration, it was the case in which I broke off the scoop.

As to the anterior incision, I am positive you can, by adopting a certain surgical technique avoid getting into the joint, even though you get close to the cartilage, by incising the tissue and separating the capsule very much as you do the peritoneum in a suprapubic incision. I have done that a number of times, and have never had an accident in opening the joint, although I have practiced it in recently septic and old septic cavities. If we operate on an acute case we will probably find the abscess mostly in the posterior region, or on the side, but there is no necessity to open the limb on that side. The reason the incision has always been made here before is that fluctuation was on the side where the abscess had broken through the bone, and the incision being made here and widened, then the surgeon removed the sequestrum through the opening of the bone. But where the sequestrum reaches over to the other side you get a perfect view from above and you can chisel down to the neighborhood of the joint without opening the joint, and empty the whole cavity.

So far as sequestrum is concerned, Dr. Eisendrath misunderstood me. I spoke of two shadows. (Drawing on blackboard.) Here is a drawing showing normal bone. If I compare this normal bone with the pathologic, the normal shows a shadow on both sides (pars eburnea), in the center it would show the spongiosa a lighter structure, and therefore shows less density. If there is a sequestrum, such as we see in any one of these cases, then we observe a double contour with a light area in the center. If there is nothing but a light area it is only an abscess. If it shows white parts, these are the coherent parts of the sequestrum of the bone which we remove afterward.

THE PRESIDENT: Inasmuch as your paper deals with the treatment, I wish you would say a few words in regard to the part bismuth plays in the treatment.

DR. BECK: I thought I would not say too much on that subject. Recently Reich from Bruns' clinic has published an extensive paper in which he speaks of bismuth poisoning. The paper contains some very interesting material. He is of the same opinion that I am, namely, that bismuth paste is not a perfectly harmless agent in the hands of every practitioner, and that it should be used very carefully inasmuch as there are possibilities of poisoning. As to the question of poisoning, we have probably made as many injections as anybody else, yet we have not had a case of fatal poisoning. We have observed our cases carefully; we have selected the amount of paste to be used, and we have been very careful as to the manner in which it was injected. I may say, we have injected the bismuth paste near the cranial cavity, we have injected it into the pleural cavity, and into the lung, and we have had patients spit up large quantities of it. We have injected it into sinuses, communicating from the outside, and we have not had any bismuth poisoning. If a practitioner takes a syringe and squirts the paste into a sinus with all the force he has at his command, then that will be probably sufficient to tear open some non-resistant tissue, or perhaps rupture some blood-vessels, and he will have bad results, particularly if he uses large quantities, particularly if the bismuth paste is not aseptic. I believe some of the unfavorable results reported have been due largely to the paste not being aseptic before it was injected. There have been cases of bismuth poisoning reported abroad and in this country after the most careful treatment and technique had been followed. In these cases the paste was injected undoubtedly into large cavities where the mass would easily be absorbed. On the other hand the bismuth paste may have contained arsenic or some other material, which produced the symptoms of poisoning.

The treatment is simple. After you have used an injection of this paste once in a bone cavity you will like it very much, because it will prevent constant suppuration. After its injection the cavity will only secrete a little serum on the second and third day, and afterward it will not secrete at all. Only dry material will come out. But these are the cases in which no sequestrum has been left behind.

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD NOVEMBER 19, 1909, WITH THE PRESIDENT, DR. CHARLES B. REED, IN THE CHAIR

HERBERT M. STOWE, M. D., EDITOR

SPECIMEN OF A CASE OF TRUE HIRSCHSPRUNG'S DISEASE

BY CARL WAGNER, M. D.

The specimen of giant colon was removed from an infant two years of age, and represents the first case on record in the United States of genuine Hirschsprung's disease.

Definition of the disease. Hirschsprung's disease, or mega colon, manifests itself in a persistent high grade of obstipation and large distention of the abdomen which is caused by an enormous dilatation of the sigmoid flexure and of the colon. The symptoms are observed either right after birth or develop during the first months or years of life. Very rarely has a similar condition been observed in adults. The disease has terminated in by far the greater number of cases in death, which was often preceded by colitis and the development of numerous ulcers caused by stretching of the dilated colon.

While in the adult the length of the colon measures about 130 to 145 cm., in this case we find it 154 cm.; sigmoidal sac 21 cm. in diameter; colon descendens 15 cm. in diameter; colon transversum at several places 20 cm. in diameter; the rectum 2 cm. in diameter, and ileum 1 cm. in diameter. The mesentery was abnormally long and the blood-vessels in it were very large.

The sigmoid, with its colossal circumference, abruptly narrows at its distal end to assume the proportions of the normal rectum. The effect of the sudden termination is not unlike a child's toy balloon, the rectum being the small opening by which it is inflated. The small rectum, with its thin walls, is in very marked distinction to the enormously enlarged hypertrophied sigmoid lying directly above.

The patient reacted splendidly after the operation. There was no vomiting at any time. Patient took nourishment the second day and was quite bright, sleeping at intervals, with normal pulse and normal breathing. Gases passed freely. Everything went along very satisfactorily for 32 hours, when with a sudden gasp the patient turned to the side and died without symptoms. Cause of death, embolism.

GALL-BLADDER OPERATION WITHOUT GENERAL ANÆSTHETIC

BY CARL WAGNER, M. D.

Concerning gall-bladder operations without general anæsthesia, since Lenander's (Upsala) stimulating publications on the study of the sensibility of the different abdominal organs, very many various and contradictory reports have appeared from other observers, which proves that our state of knowledge on this question is quite chaotic. It might not be amiss, then, to submit a contribution to this interesting subject.

Last week I performed a gall-bladder operation under local, instead of general anæsthesia, on account of the condition of the patient's heart, and a severe kidney lesion. The patient, 40 years of age, was very frail, had been under the care and study of our internist, Dr. Small, who had made a diagnosis of infected gall-bladder, and advised operation. The application of Schleich's solution had but little effect on the skin. Incision through the muscles caused intense pain, which was, however, only of momentary duration. The fascia reacted some, but far less than the muscles. The incision of the peritoneum was not felt at all, nor the opening of the gall-bladder, but traction on the gall-bladder or on the parietal peritoneum caused very severe pain. When, however, the peritoneum was held steadily with the artery forceps clamped to it, the patient informed us that she felt nothing, not even the pressure of the forceps. Pressure and displacement of the liver was each time accompanied with a severely painful response, which, however, might have been to some extent due to the congested condition of the organ. Exploration of the deeper bile tracts, cystic and common ducts, disturbed the patient very little. Examination of the pancreas gave her sharp and piercing pains, in spite of the fact that no pathologic change had taken place in this organ. Eventration of the stomach, duodenum, colon, and omentum was hardly perceptible to the patient. But traction of the cæcum produced a

sharp outcry, in spite of the fact that the bowel in question and appendix were normal. The insertion of laparotomy compresses into the abdominal cavity brought no complaints, but the pressure of the sponges upon the cut edges of the abdominal wall was not tolerated very well. The insertion of the tube into the gall-bladder, and the placing of the purse-string around the gall-bladder left her very tranquil. Directly after the completion of the operation, as well as all the time since, the patient states that she has not experienced any uncomfortable feeling whatsoever, a fact which at first seems very strange, compared to the intense suffering which we observe in most cases of operations for gall-bladder diseases done under general anæsthesia, and it seems to me from this experience that the more careful and less handling of the peritoneum in this case might serve as an explanation, because every time the patient reacted upon the slightest traction of the peritoneum we immediately allowed a few moments for rest, and exercised more care from minute to minute, in regard to this deleterious element of traction of the peritoneum. It is noteworthy that neither during the operation, nor at any time after it, did nausea or vomiting ensue.

SPECIMEN OF EMBRYO OF SEVEN OR EIGHT WEEKS, WITH PLACENTA OF FIVE OR SIX MONTHS DEVELOPMENT

By A. McDERMID, M. D.

The patient under discussion is 26 years of age, married five years. Has had one miscarriage and two children; youngest born July, 1908. She began to menstruate in November, 1908, and did so regularly till February, 1909, when conception is presumed to have occurred. The patient sustained a fall in June or July, hurting her back, but suffered no other ill effects. She began to flow in June and continued to do so without missing a single day until the night of October 25th, when I was called on account of severe hæmorrhage. She stated she had had a similar hæmorrhage a week previously. I applied a tampon and sent her to the hospital the following morning. She was faint and exsanguinated. There were no labor pains. The fundus reached nearly to the umbilicus corresponding to about a five and one-half months pregnancy. Administering chloroform, I found a central placenta prævia, dilated the cervix manually, perforated the placenta, and was surprised at not feeling the limbs or any portion of the fœtus. I was able, however, in 25 minutes from commencing the chloroform, to extract the placenta and membranes. We then discovered this embryo of the 7th or 8th week of pregnancy, being one inch or less in length. You can see indications of the eye and ear and of the budding extremities. The umbilical cord is scarcely two inches long. The placenta on the other hand shows a development of 5 or 6 months, being 5 x 4 inches in diameter. It contains a number of hæmatomata of the size of a small grape. These are variously described as the result of interstitial hæmorrhage, apoplexy, nfarction, or thrombosis. The interesting feature is the great disparity in size between the embryo and placenta. There is also a placenta succenturiata.

DISCUSSION

Dr. George Schmauch: This specimen is very interesting. Most authors have denied growth of the placenta after death of the fœtus. I have always felt that proliferation of the epithelium covering the placenta does occur. The placenta in Dr. McDermid's case is of the size of a four months' gestation. The embryo appears to be well-developed and not macerated, so that apparently the placenta continued to grow without a corresponding growth in the fœtus. No hæmatomata appeared to be present.

Dr. Rudolph Holmes: Nine years ago, in Vienna, I saw a case of development of the placenta with an accumulation of liquor amnii out of all proportion to the size of the fœtus, which had been dead some considerable time without any maceration. There have been a few cases reported of death of the fœtus, with continuation of placental growth. The report was that the fœtus had died, but for some reason did not macerate, and was not absorbed, a condition I believe first described by Breus. Ordinarily, in death of the fœtus without abortion, within the first weeks of pregnancy, there may be entire absorption of the fœtus. I believe this is an example of Breus' "tuberöse subchoriala Hämatom der Decidua."

Dr. Kolischer: This case was first described by Neumann as one of hæmatomata tuberosa placentalis.

PREMATURE DETACHMENT OF NORMALLY SITUATED PLACENTA

By MARK T. GOLDSTINE, M. D.

DISCUSSION

Dr. Rudolph W. Holmes: This is a subject in which I have been very much interested, because in 1900–01 I worked nine months gathering material, tabulating cases, studying them and then making deductions. There is no question that premature detachment of the placenta as a pathologic entity occurs about once in one hundred cases; at least if one carefully examines all placentæ, one will find clots on the maternal surface which have existed some considerable time, sometimes for such a long period that the hæmoglobin is absorbed and putty-like masses remain. In other cases there is a material hæmorrhage of the size of a hen's egg, or larger, without any symptoms on the part of the mother. These instances are of pure academic interest.

The clinical cases are undoubtedly less frequent. Up to four or five years ago I maintained that ablatio placentæ was more frequent or as frequent as placenta prævia. I have been convinced, however, that it is not as frequent as placenta prævia. It was merely an accidental circumstance that the cases I had aggregated the number of cases of placenta prævia. Dr. Goldstine is a student of the Rotunda, therefore, looks upon this question from the Dublin viewpoint. During a short stay at the Rotunda one of the ex-assistant masters told me that in the years he was associated with the institution he had seen many cases which were denominated premature detachment of the normally situated placenta, but had seen very few really typical instances — that many of the cases were high lateral prævias. In Vienna I was told that a typical ablatio placenta was very rare. I have been fortunate in seeing some nine or ten characteristic cases. Locality seems to have an inexplicable relation, for Dublin frequently has the cases under discussion while Edinburgh and Glasgow have them less frequently.

I think accidents have very little to do with the trouble, as was originally pointed out by Ramsbotham many years ago: most of the case reports I have read in which the causal factor was some accident could not have been thus due unless there were some marked pathologic change of the decidua serotina. Pathology bears a more rational connection than the many absurd explanations advanced by writers of even very recent times.

One of the things I learned from the study of my accumulated cases was that there are two types of ablatio; one, the absolutely concealed hæmorrhage, of which there are something over a hundred on record; the other, the relatively concealed type, in which there are external evidences of bleeding. The former type must be of exceeding difficulty of recognition, for such a goodly number only were recognized on the post-mortem table. The patient may collapse, and then dies; at the post-mortem examination the uterus is found filled with blood, not a drop of which escapes externally. This form may very easily be considered by the careless a case of fainting or perhaps heart disease. In the relatively concealed type, the amount of blood which appears externally has no relation to the amount of intrauterine hæmorrhage. The woman may have terrific bleeding externally, or she may have a very slight patent hæmorrhage, yet after delivery enormous clots of blood escape showing that there was retention of blood within the uterus. My collation of cases showed that in most instances of the relatively concealed type there was retention of blood, formation of clots, and their expulsion post-partum: if such fact were not noted in the case reports, an opinion based on my nine or ten cases shows that the absence was due to faulty observation or a failure to appreciate the value of this almost pathognomonic sign.

The symptoms of the concealed and relatively concealed are identical, barring the one sign absent in the former — the external bleeding. The symptom complex is identical in both — in both we see the same degree of stretching and tearing pain located within the uterus as though the organ were about to rupture: whether the uterus was hard or flaccid, whether the accessory tumor developed or not, whether the escape of blood serum occurred or not, whether the symptoms of blood loss were slight or severe, offer no differentiation between the two types — the sole and fundamental difference between them lies in the manifestation of external bleeding. Further, the external hæmorrhage is only a corroboratory sign of internal bleeding. Again, the amount of blood escaping never should be the gauge of actual blood loss, because it does not bear a relation to the amount flowing from the uterine sinuses. The cervix is apt to be flaccid, due to the anæmia, and the labor induced by the irritation from an overdistended uterus. One of my patients who had a particularly typical form had one finger dilatation, yet the cervix was so relaxed that it was possible to dilate the os, perform version and extraction,

manual removal of the placenta, utero-vaginal tamponade within twenty minutes.

I cannot agree with Dr. Goldstine that ablatio placenta is easy of recognition — the fact of the reputed rarity of the condition is sufficient evidence of the difficulty of diagnosis. Women will faint, will have pains, may have a "show," and the patient and doctor will believe the onset of labor is at hand; if bleeding is profuse a diagnosis of placenta prævia is generally made. It is a remarkable fact that so grave a disease, frequent as it is, has almost no literature, whereas placenta prævia fills pages of the Surgeon-General's catalogue.

As to treatment — I believe there is one place where the indication is clear and strong to administer ergot before the uterus is emptied, and that is in this condition: it should be given in small doses, repeated; in particularly severe cases with lax uterus I would not hesitate to give a dram. While getting ready for delivery an intelligent hand should practice massage — this is particularly essential if the uterus be flaccid. I believe the membranes should not be ruptured until delivery may be consummated: the escape of the liquor amnii means a lowered intrauterine pressure which may determine increased blood flow. The Rotunda has adopted the use of the tampon with a firm binder as a routine treatment. I never have seen a woman who would tolerate a *tight* abdominal binder — and I have never seen a uterus, contracting and relaxing as it will, held in place by a binder, even though it be supplemented with a horse shoe pad.

A woman may die undelivered without any blood appearing at the vulva — the uterus being enormously distended. One observer found a case where the woman had two gallons (!) of blood in the uterus — an absurdity — yet she recovered. We know that absolute concealment may be brought about by one of the four methods first explained by Goodell; the same may be brought about by the tampon; whatever tonicity the uterus may have it is definitely certain that the uterus is not so completely "filled" in the interval of contraction as at the height of uterine action; therefore, the tampon is no security against bleeding from the uterine sinuses. To my mind the conversion of a patent hæmorrhage into an occult one is questionable treatment for ablatio placenta.

I believe the procedure indicated is a very clear and definite one if the patient is at all in a critical condition; give saline solution, massage of the abdomen with support of the uterus by an intelligent hand, when preparations are completed, deliver in the most rapid manner possible. Manual dilatation is generally easy on account of the relaxed condition of the cervix; to do a vaginal Cæsarean section in this condition is hazardous, as it generally must be done blindly due to the flow of blood which has been stored up within the uterine cavity. To my mind an abdominal section would be preferable where the cervix is unduly resisting or actually rigid. When full dilatation has been secured, version and rapid extraction should be carried out — strong fundal pressure being an adjunct to the delivery. As endometritis plays such an important role in the etiology there may be a firm placental adhesion in part, although a considerable portion may have been separated in the process of premature detachment. Therefore, manual removal of the placenta should be the rule; directly thereafter the firm utero-vaginal tamponade should be employed.

Dr. Hengge, Munich, Germany: I was surprised at the large number of cases observed by the author. I have seen few of them. The favorable results from tamponade are also surprising. In Germany we divide the treatment into the home treatment and the clinic treatment. In the home the treatment cannot be carried out as rapidly as in the clinic. These cases belong to the clinic, because the treatment should be carried out rapidly, and besides, thorough asepsis in the home is difficult. At home tamponade would probably have to be resorted to. We try to deliver every woman in the clinic, because there all the sequelæ can be treated properly, which is not possible in the home. (Translation.)

Dr. A. McDermid: I am glad to know that these cases occur only once in a thousand, because I began to fear that I was not very observing. I cannot believe that they are at all as frequent as placenta prævia. I have never diagnosed a case of this kind, before delivery. I have suspected the condition after delivery in a few cases, because of the enormous rapid post-partum hæmorrhage. If these cases are so common, I surely would have seen some of the fatal cases, but I do not recall a single case, either ante-partum or post-partum. I admit the possibility of the condition, but I have not seen it.

As to treatment, I agree with Dr. Holmes. I would not rely on the binder and tampon unless manual dilatation and rapid delivery were impossible.

Dr. Charles S. Bacon: I think that the division of cases into clinic cases and private practice cases is very proper. There is no question that the surroundings dictate in a measure the method of treatment to be employed. There is no difference of opinion in regard to the treatment of cases

in which the cervix is dilated or easily dilatable. Such cases should be delivered at once. Where the cervix is not dilated and cannot be dilated in a reasonable length of time, we must choose between a surgical operation, some form of Cæsarean section, or accouchement forcé, including rapid dilatation with the Bossi instrument, or the tampon. With modern technique in abdominal Cæsarean section, one would obtain in the clinic better results, as far as the child is concerned, at least, than from the use of the tampon. This is not true in private practice.

One important point in the paper is the description of the technique of tamponade that has been found of value in the Rotunda. We have so little experience in the management of these cases that we must profit by the experience of others. It is rather dangerous to object to points in technique for theoretical reasons. Dr. Goldstine insists on the use of cotton for vaginal tamponade instead of gauze. Cotton that is wet will pack well. One cannot pack the vagina well with gauze, but can with cotton. In regard to the external bandage, I believe that it is very much better than relying on the hand. I suppose that Dr. Goldstine will answer the objection that it is practically impossible to apply the binder and have the patient stand it.

Dr. Frank Cary: I believe these cases, in a severe form, to be very rare. Given a patient in a condition of shock, I agree with Dr. Holmes that rapid manual dilation and turning should be tried, no time being lost in delivering the placenta. If this is impossible, Cæsarean section seems to me to be indicated.

Dr. H. M. Stowe: It is very difficult to apply the binder so that it will force the uterus downward upon the vaginal tampon. It generally presses it backward against the posterior abdominal wall. When the uterine fundus lies close to the costal arch, especially in the primiparous woman, no abdominal binder, however skillfully applied, will exert pressure in the downward direction. It may be possible to exert such pressure with the hand but the maneuver may be difficult and even impossible and to maintain such pressure for a period of hours is most difficult.

It is claimed that the vaginal tampon arrests the hæmorrhage by counterpressure upon the uterine artery. This artery necessarily lies a short distance above the upper extremity of the plug, and the artery and its tissues tend to recede in the direction of the abdominal cavity and counterpressure is not effective. Smyly states that hæmorrhage is arrested by the stretching of the uterine artery over the tampon. It is difficult to conceive how this is possible, as the vessel is enlarged during pregnancy and becomes so tortuous that it can accommodate itself to a certain amount of stretching without interfering with the circulation. It is a physiological fact that the veins are more compressible than the arteries and if stretching is hæmostatic, the action would be more effective upon the uterine vein. This would prevent the reflux from the uterine walls and thus increase the bleeding. The ovarian artery, which supplies a considerable quantity of blood to the placental site, is absolutely unaffected by the tampon either by stretching or compression.

The ideal treatment of the serious grades of this condition is that which calls for the rapid delivery of the fœtus, either through the pelvis or by abdominal Cæsarean section.

Dr. M. T. Goldstine (closing): In regard to the use of ergot: The oxytoxic properties of ergot are doubtful. It is not indicated in any other condition where there is anything in the uterus.

With regard to massage: one can see the futility of massaging the uterus in tonic contraction. If we get any result from the massage, we dislodge the clots in the blood-vessels, which may be checking the hemorrhage to some extent. I would not massage the uterus after the third stage of labor for this reason.

As regards rapid delivery, thirty-three per cent of the women die of post-partum hæmorrhage. It is the exception rather than the rule for the binder and tampon to cause a post-partum hæmorrhage. I stated that the tampon should be left in for a long time but used only as a means of tiding the patient over until an operation can be performed with safety. The great majority of these patients are tamponed for post-partum hæmorrhage after delivery. The tamponing of the vagina first is no more unscientific than the tamponing after post-partum hæmorrhage has occurred. If we can do away with the tampon in the uterus after delivery, I think tamponade of the vagina is more justifiable. In tamponing the vagina we remain in a septic cavity; we do not enter a clean one, as is the case when we tampon the uterus.

As to cases of concealed hæmorrhage, I have seen them. The cervix in a concealed hæmorrhage is never flaccid nor easily dilatable. If not in the best condition, one cannot dilate the cervix quickly and easily. It takes time, and we are decreasing intrauterine pressure and the more chance there is of blood to flow into the uterus.

As regards separating the placenta: in the great majority of cases of accidental hæmorrhage, the placenta is separated entirely and there is no indication to go into a uterus to separate a placenta which is already separated.

SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION

TWENTY-SECOND ANNUAL SESSION, HELD AT HOT SPRINGS, VIRGINIA, DECEMBER 14, 15, AND 16, 1909. THE PRESIDENT, DR. STUART MCGUIRE, RICHMOND, VIRGINIA, IN THE CHAIR

The Association met in the Ball Room of the Homestead Hotel, and after announcements by the Chairman of the Committee of Arrangements, Dr. Lewis C. Bosher, Richmond, Virginia, the scientific work was begun.

A BRIEF DISCUSSION OF SOME OF THE SURGICAL JUNK DEMANDING FURTHER SURGICAL INTERFERENCE

DR. JOSEPH PRICE, of Philadelphia, stated that a short time ago a patient entered his office, and asked him to re-open her abdomen, and to correct, if possible, a distressing condition that she could bear no longer. Her abdomen had been opened three times, a pelvic operation having been followed by two gall-bladder operations. She complained bitterly of a griping sensation in her epigastric region, followed by nausea and starvation. In a short period of six days he had re-opened four abdomens for post-operative, pathological, and operative sequelæ. Large numbers of these patients were objects of pity and mercy. One of the number had her abdomen opened eight times. Fortunately the late operations were complete procedures, the reproductive organs and appendix were gone, leaving only a ventral hernia, omental and bowel adhesions, to be freed. One of the late operators drained her gall-bladder, leaving a fistula and distressing adhesions. He liberated the stomach, bowel, and other adhesions, exposing the gall-bladder, disorganized and charged with pus; its clean removal would probably result in a cure.

Dealing with surgical junk required more than the ordinary hospital apprenticeship. The operations done by pioneers in abdominal surgery were free of operative sequelæ. The percentage of recoveries was good in the country. He had had the opportunity of seeing a large number of the patients operated upon by the first school of abdominal surgeons. They constituted an interesting group of patients, none of them complaining of those common symptoms of modern operations. The high death rate in the hands of some few operators explained surgically the distressing condition of the few that did recover, but commanded more surgery.

It was needless to detail the variety of pathological complications from the pelvic basin to the pyloric orifice of the stomach in the great variety of surgical afflictions found between those two points; but if dealt with scientifically, according to surgical light, junk would not be the result. In the suppurative forms of disease of the pelvic viscera above the head of the cæcum, and on up to the suppurations about the liver, the advanced thinkers and workers had given us perfected procedures, and, if practiced completely and scientifically, but few uncomfortable sequelæ would follow. It was exceedingly rare to get junk from the operating tables of the experts. There was prolonged and painstaking effort on the part of the clinical schools to correct the common errors and calamities. Our precise knowledge of pathological calamities and the early efforts of relief now gave us about a *nil* mortality.

We must have more prolonged hospital apprenticeship in our young men at the hands of skillful operators. All of our graduates should go through a hospital. The public hospitals, like the private hospitals, should be made clinical schools, and from this clinical schooling, on top of a thorough scientific education, we would get a new class of practitioners, better pathologists, and better diognosticians. The resulting thoroughness, scientific and clinical, would give us a stronger profession with better judgment. Doctors with better education would give us the patients early, while the troubles were simple, free of invasion and infection, simple operations demanded, extensive and complicated procedures rare.

All junk surgery was uncertain; it might be simple, or it might be too complicated for completion.

DISCUSSION

DR. LEWIS S. MCMURTRY, of Louisville, said that Dr. Price had called attention to one of the greatest evils prevalent at this time in relation to abdominal surgery. He alluded particularly to incomplete operations being done, and to a large number of men who were operating in the abdomen who ought not to do so without having served an apprenticeship in this work. When this association was first organized it was far more difficult for men who were not qualified to do abdominal surgery than at the present time. To illustrate: let us take any well-appointed hospital in any city in this country and it has a well-appointed operating room. There was a nurse who was well qualified to prepare patients for operation

and who understood the technique of modern aseptic surgery, and an operator who had no operative skill could put on a pair of rubber gloves that had been boiled and, if the preparation had been carried on by this competent nurse, the operator could open the abdomen of the patient, stir around in there a good deal and the patient might not die. We all knew that fifteen or twenty years ago if an operator undertook to do this kind of work, the patient would die of sepsis. He could not clean his hands, he did not have the facilities of the modern hospital, and sepsis was the result, and that soon finished his career. At the present time there were more men who were doing tyro-surgery in the abdomen than before. There were men who, without having served any apprenticeship, undertook surgical operations which Dr. Price had characterized as junk, in that they were incomplete and done by men who were not qualified to do them. Hence, patients went to surgeons with adhesions of all kinds and ptosis of the viscera and other troubles. It was the duty of members of an association like this publicly and privately to condemn men entering upon this work without having served an apprenticeship and without being properly qualified before they undertook it.

Dr. A. Vander Veer, of Albany, New York, said he always felt that there was a certain amount of risk in encouraging abdominal surgery in small hospitals, because much of the work was necessarily done by men who had not served a sufficiently long apprenticeship to do the work thoroughly and completely. Not infrequently a correct diagnosis was not made and incomplete operations were undertaken which did not reflect credit upon American abdominal surgeons. Within ten or fifteen years there had been a sort of feeling on the part of our younger surgeons to do as many operations as they could upon a particular patient. In this regard they sometimes erred. He had seen many cases that had terminated in what Dr. Price had termed surgical junk. He appreciated this paper, because it was not only timely, but it dealt with a subject to which more attention should be paid at the present time. It was the kind of paper for the younger surgeons to read carefully.

Dr. William M. Polk, of New York City, stated that the trouble with some of us was that perhaps we had been endeavoring to work out pathological problems on live subjects and in so doing we might have left conditions within the abdomen in our endeavor to preserve structures, and so forth, that really had no business there. And in so far as he had been a sinner in that direction he was free to confess that probably he deserved all the criticism that the distinguished essayist had made. He was particularly obliged to him because in his paper he opened up the whole field of surgical work. He found that the average person had been so well educated that his or her mind was made up as to what they wished their physician to do long before they interviewed them, and if he failed in any way to fall in with their preconceived notion they at once went elsewhere. He stated that we all know perfectly well that there were a great many of the younger members of the profession who had not that stiffness of spine that comes with age, that kind of ankylosis of the vertebral column which was beneficent in its influence, and which did come with age and experience. Dr. Price had very aptly said something that we could not trifle with. He had alluded to the craze for medical education. While this was not an opportunity for moralizing, yet he thought he was correct when he said we were absolutely responsible for this state of affairs. Self-righteousness would not help the situation one bit. We have simply got to get down to the first principles as to what our knowledge of the situation taught, or what was the correct thing to tell our people, whether they were patients or medical students, and when we had reached that frame of mind we would get somewhere, and we would not move one inch in the direction to which Dr. Price alluded until we made up our minds to rid our own minds of the junk that was in them.

ADHESION OF SIGMOID TO THE TUBE AND BROAD LIGAMENT AS A CAUSE OF PAIN IN SALPINGITIS

Dr. Hubert A. Royster, of Raleigh, North Carolina, stated that the Fallopian tube was the most frequent seat of inflammatory disease in the pelvis. It was the narrowest portion of the channel from the vulva to the ovary and was the least resistant to infection. Pain there was more concerned with salpingitis than with ovaritis, whether attended by a gross lesion or not. Too many times the ovary had been regarded as the offending organ, and needlessly removed. In some instances a diseased tube had been blamed as the sole cause of pain, while other factors produced by the salpingitis, or rising independently of it might be overlooked. Somewhat less than three years ago he made a clinical observation, which bears upon this question.

Mrs. S., thirty years of age, married seven years, had given birth to one child about a year before. Previous to that she had had an abortion performed on account of pernicious vomiting. Several weeks before he saw her the same pro-

cedure had been again gone through with for the same reason. For two or three years she had suffered from typical tubal dysmenorrhœa, the pain began a week before the flow and continued throughout the period. Intermenstrual pain was constant, and referred chiefly to the left iliac region; there had been several slight attacks of pelvic peritonitis. Defecation was particularly distressful. Almost every day the patient took morphin or heroin. Examination revealed extreme tenderness in either side of the pelvis, especially in the left. A diagnosis of chronic salpingitis was made. At operation, March 28, 1907, both tubes, tortuous and thickened were removed. Their removal was considered justified in view of the history. The ovaries were what are called "cystic." He removed the left and excised two-thirds of the right one. In bringing up the left tube for inspection he found that the sigmoid flexure was adherent to its fimbriated end, and also to the upper surface of the broad ligament. These adhesions were carefully divided, and the raw areas were closed by fine catgut sutures. The result was all that could have been expected. The patient immediately improved, but not until six months had passed was she really relieved. She was now entirely well, menstruating regularly without pain.

He had the records of eight similar cases in which the sigmoid adhesion was apparently the sole source of left-sided pelvic pain. He was convinced that the condition was one to be reckoned with. Its association with salpingitis or other disease of the pelvis could not, as a rule, be determined beforehand, but it might be suspected in the absence of other lesions, to account for the suffering and more especially in the presence of painful defecation. This had been a constant symptom in the instances which he had observed.

When discovered the adhesions must be dealt with as seemed proper in the given case. After snipping the bands which fix the sigmoid to the broad ligaments, there were left two triangular raw surfaces, one on the bowel and the other on the ligaments, with their bases together. These formed a diamond-shape area. The peritoneal edges were then closed over this space by a continuous catgut, applied from below upward. The sigmoid was thus allowed to drop lower down into the pelvis, away from the tube and ligament, a maneuver which, in his opinion must be executed to secure permanent relief. Covering all denuded places was not less important. In one patient who had also a chronic cystitis, cured by a vaginal cystotomy, he failed to close the raw area as well as he should, have done, and she was still, now and then, having pain on defecation, undoubtedly because of the re-forming of adhesions. This was the only case of the nine, that, so far as he knew, had not been relieved.

DISCUSSION

Dr. Henry T. Byford, of Chicago, stated that when a patient presented herself with pelvic disease he always asked her whether she had pain or not on defecation. Then he asked the question: Do you have any mucus in the stools? He thought we frequently found mucus in the stools in such cases, but not the abundant mucus which comes from a general colitis, nor the tendency to tenesmus with mucus, that comes from inflammation low down in the rectum. There was pain on defecation, particularly when these patients were at all constipated, and there was mucus in the stools. In connection with the symptoms, if the pain was in the iliac region there would be found adhesions to the sigmoid flexure. In another class of patients there was pain in the back, and no pain in the iliac region.

With regard to the size of the sigmoid flexure, these cases were apt to occur in women who were constipated a great deal, and who had a distended colon or sigmoid flexure, and the giving of laxatives and perhaps strychin and other remedies to tone up the condition of the alimentary canal, with proper diet, would be sufficient, rather than to think of any surgical procedure, in the ordinary cases.

Dr. Robert T. Morris, of New York City, stated that there was one place where the surgeon should allow adhesions to remain, namely, in his subliminal mind. There was no one thing more often overlooked in his experience than peritoneal adhesions, and their influence. Dr. Royster liked to close raw surfaces by continuous sutures. They saved time by one or two methods. The commonest one which he had used was to sprinkle aristol over the raw surface and wait until lymph accumulated and engaged the aristol in a mesh. This acted as an obstacle to further adhesion, and he had found it satisfactory in his experience on animals. The other method was to use sterilized animal membrane. That took a little longer, but in such cases as Dr. Royster had described, aristol powder would engage itself in the lymph coagulum, and present an excellent mechanical obstacle to re-adhesion.

Dr. Thomas S. Cullen, of Baltimore, stated that he had a patient at the present time who had complained for five or six years of severe constant pain in the left side. On opening the abdomen he found the uterus perfectly normal. The tubes and ovaries showed no alteration.

There was no thickening of the ureter. In making a closer examination of the sigmoid he found it adherent to the entire left broad ligament, extending as far forward as the round ligament. He adopted a procedure similar to the one described by the author of the paper, that is, freeing the adhesion as thoroughly as possible, and closing the raw surface of the broad ligament by a continuous catgut suture, and the raw surfaces of the rectum by interrupted suture, on account of which slight tearing was not so likely to occur.

DR. I. S. STONE, of Washington, D. C., stated in opening the abdomen for tubercular peritonitis and allied conditions they could never hope to separate all adhesions in such cases. It would be folly to try to do it. There were many women who had extensive adhesions, one organ being thoroughly adherent to its fellow, yet there might be no pain on defecation, or pain at any time. Where were they to stop in separating adhesions when they had such cases as that? Not long ago a woman came to him in Washington with a history of pain in the scar of a former operation. She had been operated on in Paris by an eminent surgeon; a consultation with three physicians was held. There was pain in the cicatrix and that was about all the woman could tell. The majority voted in favor of opening the abdomen to release the adhesion. When the abdomen was opened a slender adhesion of the omentum was found. The family was told that adhesions were found and separated. What else could they be told? The patient suffered precisely the same as before the operation. He found he was getting excellent results from operating upon patients and placing the bowels in the very best condition he could for continuous passage of flatus and fæces. He had separated adhesions of the sigmoid and in some cases had been astonished to find not only the greatest improvement, so far as pain and local distress were concerned, but in the general improvement of the patient, when the sigmoid had been sutured up out of the pelvis, where there should be continuous passage of flatus and gas, instead of more or less obstruction, produced by a circular folding or duplication of the sigmoid in the pelvis. Such an operation as that had given him more comfort than the mere separation of adhesions.

DR. W. P. CARR, of Washington, D. C., stated that they had all seen cases in which there were a great many adhesions and no pain, and in other cases where there was a slight adhesion with a great deal of pain. It was the situation of the adhesion and not the extent of it that caused trouble. A patient experienced great pain where there was a slight strong adhesion attached to a small area of some movable organ; whereas in the case of an extensive adhesion to a large surface the weight was sustained without any pain whatever. The most painful adhesions had been those where there was a small band pulling on some point of a movable organ. He had seen a number of such cases, and had relieved the patient by separating the adhesion not larger than a lead pencil. On the other hand, large adhesions, especially around the liver and the stomach, did not seem to produce any pain.

DR. ROYSTER, in closing the discussion, said that he was very glad Dr. Byford mentioned the discharge of mucus, because that was very important. The question then arose in such a case, was not the intestinal condition the cause of adhesion rather than the pelvic disease? Where the adhesion was due to intestinal stasis the discharge of mucus was a prominent symptom, but where it was secondary to pelvic disease, mucus was not a prominent symptom.

THE TREATMENT OF ADVANCED EXTRAUTERINE PREGNANCY

DR. REUBEN PETERSON, of Ann Arbor, Michigan, in his paper drew the following conclusions: 1. Wherever conditions permit, operation for the removal of the gestation sac is indicated in the first half of an extrauterine pregnancy since, at this period, the mother is in great danger from rupture and sepsis and the chances for the survival of the fœtus are very poor. 2. During the latter part of an extrauterine gestation the chances of rupture and a fœtal hæmorrhage are very much less (4.8 per cent) and the chances of the survival of the fœtus are very much greater. 3. While malnutrition and malformation of the extrauterine child are more common than with the fœtus under normal conditions, they are not frequent enough to contraindicate attempts at saving its life; hence, under favorable surroundings, when the patient can be watched, she should be allowed to go within two or three weeks of term before operation. 4. Since the maternal mortality is more than twice as great after operation in advanced extrauterine pregnancy where the placenta is left behind, its removal should be one of the cardinal principles of each operation. 5. In the discord variety of placenta, where only a small surface of this organ is not attached, the blood supply must be controlled either by tying the vessels, or by compression of the aorta before an attempt be made to remove the placenta. 6. When, for any reason, removal of the placenta is impossible, the sac should be switched and the placenta shut off from the

peritoneal cavity by gauze. 7. Dependent drainage through the vagina should be secured whenever possible.

THE ADVANTAGE OF NEGLECT IN APPENDICITIS OPERATIONS

DR. ROBERT T. MORRIS, of New York City, said they had conscientiously tried to do too much in appendicitis operations and had damaged patients unnecessarily. According to the principles of the pathological era in surgery they felt bound to remove all the products of infection in a most thorough way. They made elaborate arrangements for drainage, and they took the greatest care to avoid infection of the normal peritoneum. All of these things which they did with so much care and caution were commendable until they learned to step over to the principles of the fourth or physiologic era in surgery, allowing the patient to do most of the work of managing infection himself. Their function to-day was merely to turn the tide of battle, and to place the patient in such condition that he could call out his own resources and fight the battle better than they could do it for him, no matter how kind their intention, or how scientific their method that was based upon the best knowledge that they had until recently. The application of most of their resources damaged the patient in such a way that he was prevented from calling out his own good resources. If they neglected to protect the peritoneum by putting in a mass of gauze while at work, it gave the patient an advantage, because the fear of pus infecting the normal peritoneum was now known to be a fanciful fear. If they neglected to make very long incisions or multiple incisions, it gave the patient an advantage because he avoided the shock incident to large incisions, and he lost the menace of subsequent hernia. If they neglected to wash or wipe the field of operation thoroughly the patient had the advantage of avoiding the shock, and of the prolonged period of anæsthesia required for such detailed work. If they neglected to cleanse and beautify the surroundings of a post-operative fistula, the patient had the advantage of rapid closure of such a fistula through rapid contraction of connective tissue which was not meddled with.

DISCUSSION

DR. JOSEPH PRICE, of Philadelphia, stated that he wanted to condemn unqualifiedly stump operations of every character, for the reason that surgeons were too far advanced to leave one-sixth or one-eighth of the appendix when operating for appendicitis. A clean removal of the appendix was a simple procedure.

DR. W. P. CARR, of Washington, D. C., stated that Dr. Morris was certainly right in one respect, namely, that in the bad cases of appendicitis they must fit the operation to the condition of the patient. He had seen many patients recover after a simple opening had been made, and pus let out, nothing further being done except perhaps to put a catgut ligature around the appendix and remove it, if it is possible to do so at the time. Such patients would not have stood a prolonged operation.

DR. J. M. T. FINNEY, of Baltimore, wished to take exception to the word "neglect" in the title of Dr. Morris' paper, and ventured to suggest in its place the word "observance," meaning by that observance of certain fundamental principles of surgery. If there was anything that had been accepted as settled to-day it was that unnecessary handling of the tissues, or unnecessary trauma inflicted upon the intestinal organs, especially, was a surgical sin; also the unnecessary application of certain irritating antiseptic solutions to the peritoneal surface was also a surgical sin. In reference to the management of the stump of the appendix, he wanted to be considered as one of those who ligated the stump, and had always done so, and from an experience of a thousand or more cases of appendicitis, in which this had been done, he did not recall a single instance in which the slightest degree of trouble could be referred to the stump. It seemed to him they were blaming a system for the faulty application of it.

UNUSUAL TYPE OF BLADDER TUMOR

DR. ROBERT C. BRYAN, of Richmond, Virginia, in his paper reported briefly a cavernous angioma of the bladder. By suprapubic cystotomy the tumor was located with difficulty, owing to the collapsed condition of the bladder. With serrated scissors it was carefully dissected out of the mucosa, the base was thoroughly seared with the Paquelin cautery, the free edges of the mucous membrane were now stitched together with catgut, the bladder sewed to the abdominal wall, and drainage established. There was little hæmorrhage. The patient reacted well and made a good recovery. The tumor measured about three-eighths of an inch in diameter.

OBSERVATIONS UPON THE SURGERY OF THE KNEE-JOINT

DR. J. GARLAND SHERRILL, of Louisville, stated that of the major traumatisms, fracture of the patella was of chief importance. This might be a very simple injury, if, for instance, the fracture was incomplete and the fragments were not separated.

On the other hand, a compound fracture of this bone became a most serious accident. The result, after the so-called expectant treatment of fracture of this bone, might be sufficiently good to insure fair functional use of the limb. The results of the open operative treatment, however, were so much better that in healthy young patients and under proper surroundings the open method was strongly to be advised.

His plan of treatment in fracture of the patella consisted in a semilunar incision across the front of the joint at, or just below, the site of the fracture. Any clots of blood present were removed and all bleeding vessels controlled. A lacerated tendon of the quadriceps muscle was then sutured on each side and over the patella with a chromic catgut. The fascia and skin were then closed with catgut without drainage. After the wound was dressed the limb was placed in plaster of Paris. Passive motion was advisable in the third week, and the patient could walk upon the limb before the end of the fourth week. The fractures of the femur and tibia were always the accompaniment of very severe violence and ought to be treated according to the general principles for use in such injuries.

He recorded a case in which first one and then the other patella was dislocated as a result of trauma, with a persistence of dislocation in each case. The operation for its relief consisted of an incision on the inner side of each knee through the quadriceps tendon, and the edges of this muscle were overlapped so as to shorten the attachment of the patella on the inner side, according to the method described by F. E. Bunts.

Dislocation of the semilunar cartilage proved very troublesome to the patient and frequently caused great pain as well as fixation of the joint. The internal cartilage was affected more frequently than the external and the dislocation might be partial as a folding of the cartilage upon itself, or the entire cartilage might be separated. The causative factor was in most cases a sudden torsion of the tibia, although a blow driving the tibia backward in moderate flexion might produce it. The diagnosis was to be made by the sudden fixation of a previously healthy joint accompanied by a sharp pain with subsequent restoration of function, and later a recurrence of the symptoms. Effusion into the joint might follow the injury and in some cases the cartilage might be felt in front of the joint near the margin of the tibia. Pressure over its former attachment would elicit pain and soreness. The latter was a valuable point in the diagnosis of this condition from loose (extraneous) bodies in the joints. Treatment for this condition was either palliative or operative.

The following taken from his case book was a fairly illustrative case of this condition: E. C., white, 47 years of age, was referred to him with the history of a blow upon the right knee thirty-three years ago from the kick of a horse, which the patient thought caused a separation of a fragment from the head of the tibia. Three years ago the joint began to trouble him considerably. He had felt a large floating body for a long time, and recently could feel another. The joint was swollen and locomotion impaired.

Marked synovial swelling and extension of the sac with two movable bodies were readily felt above the patella. An incision two inches long was made over the outer part of the synovial pouch through the quadriceps parallel to its fibers and two bodies were removed. The first was large, concave on its under surface, convex on its upper; about two inches in its widest part. It was unevenly rounded and presented marked irregularity of surface, with pits underneath, and rounded prominences on its upper surface and edges. These prominences were smooth and covered with glistening white firm material like cartilage. The color of the whole piece was white except near the point of attachment by a single pedicle to the synovial fringe. For a space the size of a quarter it was reddish purple in color.

The smaller body was the size of a hazel-nut and presented the same rounded irregularities; it was white in color and quite firm. A quantity of thick synovial fluid escaped when the sac was opened. The wound was sutured in three layers, several layers of gauze applied to the knee, and bandaged. Over this a voluminous layer of cotton was applied and a very snug roller. Healing took place in five days with the joint normal size. No evidence of tuberculosis. A portion of the tissue from the joint and some of the synovial fluid was examined by Dr. John E. Hays, who reported that the tissue was granulation tissue, non-tubercular. The fluid taken from the cavity was sterile. No growth on media after 48 hours.

DISCUSSION

Dr. A. R. Shands, of Washington, D. C., said he had no more hesitation in opening the knee-joint than he would have in opening the abdomen, and he had been doing it right along in cases of obstinate synovitis. In many cases of recurrent synovitis the joint had never been emptied of synovial fluid. The accumulated synovial fluid formed a mass similar to that in the bottom of an old vinegar barrel, and that was what caused recurrence of the trouble.

Dr. W. O. Roberts, of Louisville, said he agreed

with Dr. Sherrill relative to the treatment of fractures of the patella, in that he had long since given up the use of metal appliances for holding the fragments together. He resorted to the open method in the treatment of these cases where they had the advantage of a suitable infirmary. He had seen but two cases of dislocation of the patella.

Dr. Horace J. Whitacre, of Cincinnati, said he wished to report two cases of loose semilunar cartilage, one in a boy ten years of age, in which the cartilage was organized and was removed; the other in a patient in whom the cartilage seemed to be in fairly good shape, and was sutured in place. The boy remained in good condition except that he had had some pain from time to time when he exerted himself, but he had had no further displacement.

Dr. John C. Wysor, of Clifton Forge, Virginia, recalled one case in which he found fifteen floating bodies in the knee-joint, which ranged in size from the size of the end of his little finger to more than an inch in diameter. Operation was followed by a good result.

The paper was further discussed by Dr. Stephen H. Watts, Charlottesville, Virginia, and Dr. Randolph Winslow, Baltimore.

MYOSITIS OSSIFICANS TRAUMATICA

Dr. J. M. T. Finney, of Baltimore, stated that the pathological condition which formed the basis of his paper was one, the existence of which had been recognized for a long time, but only within a comparatively few years had it attracted any general attention. Including the seven cases reported in the paper, over 150 cases now have been so far recorded. There was always danger of mistaking this disease for sarcoma. Three of his cases came to him with a provisional diagnosis of sarcoma of the femur. There still existed a considerable difference of opinion as to the manner in which these bony deposits took place, and the source from which they came. He called attention to a number of distinct conditions which had been grouped under the general head of "Myositis Ossificans." These all represented different pathological processes.

The factor most concerned in the production of this trouble was unquestionably a single severe trauma, as, for instance, a kick by a horse. Nearly one-half of all the cases were observed in the front of the thigh, involving the quadriceps extensor muscle. This and the flexor muscles of the arm seemed to be the most common sites. The symptomatology was, as a rule, quite characteristic. Following a severe trauma there might be noticed the usual clinical phenomena, namely, localized swelling, tenderness, ecchymosis, and disturbance of function.

Dr. Finney discussed the diagnosis, differential diagnosis, and prognosis. The ultimate prognosis was good. So far as the individual operation was concerned, it depended largely upon the stage in which it was performed. There was always the tendency to recur in those cases operated upon early during the period of activity of the osteoid tissue. Later cases did not tend to recur, that is, those in which growth of bone had ceased. The pathology of the condition had given rise to a great deal of discussion, and it was yet not definitely determined.

As prophylactic measures, aspiration, and pressure were of somewhat doubtful efficacy, although highly recommended. Early incision with the evacuation of effused blood, the thorough removal of small fragments and spicula of bone, with drainage of the affected area may, in some instances, prevent the formation of the trouble. Massage in the early stages was contraindicated, as it might affect unfavorably the development of the trouble by stimulating the production of bone. The indications for operation were the presence of the tumor, the disturbance of function, pain, etc.

CHOLECYSTENTEROSTOMY IN CERTAIN CASES OF PANCREATITIS

Dr. Le Grand Guerry, of Columbia, S. C., made a plea for the more general use of this operation in this disease. He related a case which was typical of quite a number to serve as a concrete illustration.

Mr. M., aged 38, married, several years ago had an attack of pain in the gall-bladder region with very slight jaundice, pain occasionally radiating under the right shoulder, slight fever, indigestion, etc. These attacks occurred at infrequent intervals, but there was a gradual weakening and loss of flesh. There was no sugar in the urine. A diagnosis of gall-stones or pancreatitis or both was made and at the operation a slightly distended gall-bladder, with no stones, was found. The bladder was full of the characteristic ropy, tarry, black bile and a well-marked colon bacilli odor to it. The pancreatic head was markedly enlarged. Operation consisted in cholecystotomy after the common duct had been thoroughly explored and a probe passed into the duodenum to insure the patency of the choledochus. Drainage was continued for three months, during which time the patient gained twenty pounds in weight and was completely restored to health. Later patient had another attack, at which time cholecystenterostomy was done with the result that he had been

permanently relieved from all of his symptoms and was now in perfect health.

PANCREATIC HÆMORRHAGE AND ACUTE PANCREATITIS

Dr. JOSEPH RANSOHOFF, of Cincinnati, in his paper reported three cases, two of the former and one of the latter. They were all of the ultra-acute type. In two of the cases the hæmorrhage into the free peritoneal cavity was very extensive, so that one might have thought of the rupture of one of the large vascular viscera or of a large mesenteric vein. In the third case the fluid was only tinged with blood. In two of the cases, where the hæmorrhage was very severe, no fat necrosis was seen at the time of operation. In the third a fat necrosis led to the diagnosis during the operation. One of the acute cases with severe hæmorrhage recovered after laparatomy with drainage and gauze packing. In one of the fatal cases, fat necrosis was not seen at the time of the operation nor after autopsy was made. In none of the cases was a diagnosis made. In one it was thought of on account of the slight jaundice which was present. In the critical part of the paper the time for operation and the method of procedure were considered. While, as in phlegmonous conditions elsewhere, it would seem necessary that the lesion of the pancreas should be attacked in every case from an academic viewpoint, it was not practicable in all cases. The condition of the patient was often so desperate, that a prolonged search for the lesion would be fatal, while drainage and gauze packing properly placed would give the patient a chance for recovery. Statistics with great preponderance showed the value of attacking the pancreas in a formal way as part of the operative interference as compared with drainage alone. Statistics, however, could have little value in determining the procedure to be adopted when one considered the great variation which existed in the symptoms at the time an operation was performed. Each case must be considered on its own merits and the operator must know to what extent operative interference beyond drainage and walling off the focus of the disease with tampons the patient would tolerate. No fixed or fast rules should be laid down. In regard to chronic pancreatitis he objected to the offhand way in which a diagnosis was often made at an operation by the sense of touch alone and regardless of the existence of the well-known clinical evidence of chronic pancreatic disease.

PANCREATO-ENTEROSTOMY

Dr. R. C. COFFEY, of Portland, Oregon, stated that the drawback to the development of pancreatic surgery had been that during embryological development the pancreas had been rotated out of the peritoneum. The peritoneum produced an exudate when injured which served the same purpose as callus after a fracture. The fat-splitting ferment of pancreatic juice did not readily penetrate peritoneum, but was serious when spilled in the retroperitoneal areolar fat spaces or between the layers of the mesentery or omentum.

The problem to be solved in direct pancreatic surgery was to supply peritoneum to the operative field. This was best obtained from the outer coat of the intestine by inversion. The lumen of a single intestine was too small. Therefore, it had been necessary to throw the two lumina of an intestinal loop into one which, after inversion, gave an ample peritoneal canal into which the cut end of the pancreas was implanted. Using this method the following classes of operations were done:

The tail of the dog's pancreas was cut in two and each cut end implanted into a separate loop of jejunum. Of four specimens recovered, each showed perfect union between pancreas and intestine; but no pancreatitis nor necrosis. In isolating the tail of the pancreas the pancreatic duct was found patent and delivered into the intestine. The connected end of the pancreatic duct was closed by a thin tough film, the juice all going through the duct of Wirsung. The same thing occurred where the duct was ligated by a linen ligature but not cut, for the ligature was circumvented in all cases, and the juice was freely delivered back into the duodenum through the duct which was established around the ligature. By ligating and cutting both ducts of Wirsung and Santorini and interposing omentum, and implanting the cut end of the tail, the juice of the other tail and body was freely delivered into the loop of jejunum through the implanted tail and its duct maintained. Second, the head of the pancreas and one tail and the duodenum were successfully removed in two stages. *First*, the bile duct was transplanted to intestine lower down, a gastroenterostomy done with excision of pylorus. *Second*, two weeks later we removed the body and one tail of the pancreas and section of duodenum, and implanted the remaining tail into the jejunal loop. The results were the same as in the previous cases. In all five cases the specimen showed enormous dilation of the common and hepatic ducts, and in one instance the bile duct was almost as large as the duodenum and almost as thick. The communication with the intestine was free enough to admit the end of the little finger, the distention evidently being due to intraintestinal pressure; therefore, an indirect method was

devised, which consisted of running the duct immediately under the mucous membrane for an inch before bringing it inside. The results in the three specimens removed, two of which were of two months' standing, showed that a perfect valve had been formed and no dilatation had occurred, the ducts being entirely normal in size and thickness.

Encouraged by these results the writer was now conducting a series of experiments in which the ureter was implanted into the large intestine in the same manner with the hope of preventing ascending infection here. Direct implantation of the stripped pancreatic duct was tried in six cases. While one dog lived to be killed on the 24th day and was in good health, it was found that the duct connected with the intestinal lumen only by a fistula. Four of this group of dogs died before the sixth day, showing pancreatic necrosis. One died on the tenth day. One fact stood out in all the six cases, namely, the pancreatic duct died as soon as it left the pancreas, thus leaving the inference that the pancreatic duct probably received most of its nutrition from adjacent pancreatic substance, and would not bridge the chasm between the gland and intestine, as was done in the case of the bile duct and ureter.

DISCUSSION

Dr. Joseph C. Bloodgood, of Baltimore, stated that the cause of death in acute hæmorrhagic pancreatitis had been said to be due to trypsin and perhaps other ferments free in the peritoneal cavity, and present in the blood, and these ferments produced disseminated fat necroses. If one could make a diagnosis of acute pancreatitis the abdomen should be opened and the fluid allowed to flow out and the region of the pancreas drained to prevent further intoxication with these ferments. The question of the operative treatment of acute hæmorrhagic pancreatitis was settled, and that was, evacuation of the peritoneal exudate and drainage of the pancreas.

Dr. Stephen H. Watts, of Charlottesville, Virginia, stated that during the present year he had had three cases of acute pancreatitis, one of them of the subacute variety. One of the most interesting things in these cases was the presence of hæmorrhage in acute pancreatitis, and it was a question in his mind as to the relation of this hæmorrhage, whether it preceded infection, or pancreatitis, or whether it followed it. Dr. Ransohoff had not found infection in his early cases, as the cultures had been negative. It looked as if in many of these cases there was an arteriosclerosis which might give rise to the first hæmorrhage, and that the blood subsequently became invaded through the intestine or biliary tracts.

Dr. Roswell Park, of Buffalo, stated that at the time President McKinley was shot we did not know much about the surgery of the pancreas, and when seeking an explanation for the peculiar necroses which were found in his case, he suggested that in all probability the wound of the pancreas had to do with the subsequent course of events. He really believed that this wound of the pancreas had much to do with it. He believed that unfortunate instance directed surgical attention to the surgery of the pancreas in a way which it would not have done had not that sad event happened.

Dr. Chas. H. Mayo, of Rochester, Minnesota, said he was struck with what Dr. Guerry had said with reference to cholecystenterostomy. No doubt this operation should be more frequently done. If there was jaundice present, with hardening of the pancreas, and no gall-stones, then we should at once think of the advisability of doing this operation. The question of doing it in simple inflammatory conditions, such as cholecystitis, was something for the future to decide. But these were not the gall-bladders that they would remove to-day, but they were the ones that led to further operation.

Dr. H. A. Royster, of Raleigh, North Carolina, stated that two months ago a man, 70 years old, came in with a typical history of gall-stones. He had had jaundice only once, and that had disappeared entirely. Examination of his urine three days before operation showed a well-marked reaction to sugar. They opened his gall-bladder, removed one hundred and eighty gall-stones, and drained in the usual manner. The head of the pancreas was enlarged. One week after the operation the sugar disappeared entirely from the urine, and had not returned.

Dr. Walter C. G. Kirchner, of St. Louis, stated that of five cases of pancreatitis he had met with three which were of the suppurative type and resulted fatally. In two of these cases a diagnosis was made, but the conditions were so fulminating that operative procedure did not seem to be indicated, or by the time the patient reached the hospital his condition did not warrant operation. In one case in which a pathological diagnosis was made of hæmorrhagic pancreatitis, there was no hæmorrhage in the abdominal cavity, but the pancreas itself was involved. This patient gave all the acute symptoms of pancreatitis, and at the autopsy an ulcer of the duodenum was found, which had a direct communication with the head of the pancreas.

DR. GEORGE W. CRILE, of Cleveland, stated that in making cultures from the gall-bladder in these cases of chronic infection or chronic pancreatitis, he had seen much better results from the use of autogenous vaccines than from drainage alone, that is, following the use of autogenous vaccine *plus* the drainage. Furthermore, large doses of urotropin for a certain period of time were of value. Again, in cases of acute hæmorrhagic pancreatitis he called attention to the value of nitrous oxide anæsthesia.

DR. JOHN C. MUNRO, of Boston, stated that the paper of Dr. Guerry reminded him of a case in which he did a cholecystenterostomy six or eight years ago for a lesion at the ampulla, but which proved to be a case of chronic pancreatitis. A diagnosis now could undoubtedly be made both in the chronic and in the acute forms of pancreatitis in a fair number of cases. He had had quite a number of acute cases of pancreatitis, and in a fair proportion of them had been able to make an accurate diagnosis before operation. The type of jaundice both in the acute and chronic forms was rather significant, although it was not an absolute sign on which to depend. He favored operating upon very acute cases.

DR. O. H. ELBRECHT, of St. Louis, said he would like to report briefly a case which differed somewhat from those mentioned. It was a case of chronic pancreatitis, the patient coming from an insane asylum, presenting the picture of an acute gall-stone attack, with profound icterus. The pain was severe. The case was diagnosed as gall-stones, with probably the escape of the gall-stone through the intestinal wall. A definite lump could be felt in that region, and they found dense adhesions everywhere, and an immensely distended gall-bladder. The gall-bladder was drained. As the patient was in a bad condition they did not care to explore the region of the pancreas, as it was not suspected at the time. The patient died the next day, and autopsy revealed the case to be one of primary tuberculosis of the pancreas. Sections were made from an ulceration at the tip of the pancreas and found to contain innumerable tubercle bacilli.

FREQUENCY OF CANCER

DR. ROSWELL PARK, of Buffalo, stated that cancer was one of the most important problems which confronted the medical profession to-day. He believed cancer was on the increase as a disease of modern life. When he began work in this direction there were in New York State fourteen thousand deaths from tuberculosis each year, and about five thousand deaths in cases of cancer. Now the mortality from tuberculosis had been reduced to eleven or twelve thousand cases a year, while the mortality from cancer had risen to nearly eight thousand. Their studies had established the fact that cancer was prevalent in certain localities and in certain houses. They found there were certain places where cancer was more prevalent than in others, and in a considerable number of houses several deaths from cancer had taken place. With regard to heredity, it was now stated as a fact that the disease was not transmitted by inheritance, but there was a possibility of the transmission of predisposition. This was a very important question for the laity and for us. The infectivity of cancer was quite generally established. Last year, at the meeting of the International Congress of Surgeons in Brussels, the question of cancer was discussed for three separate days, and of some three hundred who were present out of a membership of six hundred, he found the majority of surgeons present believed in the infectivity of cancer. There were still some doubters of this theory. The very fact that metastases occur during cancer was the best demonstration of its infectivity, and for him every instance of metastasis in a given case was an expression of a reinfection from the original source. As to the contagiousness of cancer, they had far more proof for its contagiousness than leprosy, or some other diseases that were considered more or less contagious. The early diagnosis of cancer was difficult, and in many instances impossible. Cancer had no definite symptomatology. If cancer could be early diagnosed or recognized, and if it were accessible to their present means of attack, and if it were thoroughly removed it could be cured, but there were "ifs" standing up in tremendous proportion, and they were insuperable apparently.

SUTURE OF THE RECURRENT LARYNGEAL NERVE, WITH REPORT OF A CASE

DR. J. SHELTON HORSLEY, of Richmond, Virginia, stated that after a thorough search of the literature, he had been unable to find a report of any case in which the recurrent laryngeal nerve was sutured. There had been considerable experimental work done, chiefly by those interested in veterinary surgery, in which the left recurrent laryngeal was divided, and implanted higher up in the vagus. Most of these experiments had resulted successfully, so far as restoring the function of the laryngeal muscles supplied by the left recurrent nerve was concerned. He reported a case in which the left recurrent was injured by a bullet wound. The case was referred to him about three months after the injury. The patient was

examined by a laryngologist, and all of the muscles supplied by the left recurrent laryngeal were found completely paralyzed. An incision was made along the anterior border of the sterno-cleido-mastoid muscle and the injured nerve was easily found in the groove between the œsophagus and trachea. The diseased portion was excised, except a small filament consisting of the posterior part of the nerve sheath. The ends of the nerve were brought together with a single suture of No. O chromic catgut in a fine curved needle. Some muscle tissue was drawn over the sutured nerve. The wound healed by first intention and the patient left the hospital nine days after the operation with no improvement in voice or in breathing at this time. The improvement was gradual, however, and two reports from a larynogologist were made after the operation. The first about two months after operation showed improvement in the muscles and the second report, fifteen months after the operation, stated the laryngeal nerve had fully recovered. The case was apparently unique.

TREATMENT OF WOUNDS OF THE HEART, WITH REPORT OF TWO CASES

Dr. Walter C. G. Kirchner, of St. Louis, in reviewing the subject of injuries of the heart stated that he wished to say that at the St. Louis City Hospital there had been five cases of cardiorrhaphy with three recoveries. He reported two of his own cases, one patient died four hours after the operation, and the other made a successful recovery. In the first case there were two wounds of the ventricles, and in the second there was a wound of the heart, one and three-fourths inches in length, which penetrated the left ventricle. The symptoms and treatment of injuries to the heart were outlined. He laid special stress on the method of approach to the heart of these injuries. He considered all wounds of the heart as serious, and gave the following conclusions: "The heart may be manipulated without serious injury to the organ and is amenable to surgical interference. Hæmopericardium with heart tamponade is a serious complication and demands prompt drainage of the pericardial sac. In suspected injuries to the heart, the wound in the chest should be carefully explored so that the extent of the injury may be determined, and in cases of doubt, exploratory pericardiotomy is indicated. Small wounds of the heart may heal spontaneously, but in all cases where hæmorrhage from the heart exists, the wound should be promptly sutured. In operations upon the heart, when pulsations suddenly cease, massage of the heart and artificial respiration should be tried as aids in resuscitation. With a minimum amount of anæsthetic the healthy lung is capable of performing its function, though to a less extent, even when the pleural cavity is exposed. Time is an important factor in injuries to the heart, and an early diagnosis should always be made. The immediate treatment should be directed to the control of hæmorrhage and shock. The chief remote complications result from infections of the pericardium and pleura. In treating injuries to the heart, the surgeon should have in mind a definite plan of attack, and the kind of flap to be used in approaching the heart should be determined by the nature of the wound in the chest."

CIRCUMSCRIBED SEROUS MENINGITIS OF THE CORD

Dr. John C. Munro, of Boston. This paper will appear in a later issue of Surgery, Gynecology and Obstetrics.

ABDOMINAL CÆSAREAN SECTION FOR PUERPERAL ECLAMPSIA

Dr. Lane Mullally, of Charleston, South Carolina, in his paper reported four cases of puerperal eclampsia. The first two cases were brought into the hospital with the usual history of eclampsia, each having had convulsions for about six hours before being admitted. The first case was delivered under anæsthesia by dilatation, instrumental and manual and high forceps, and the second by similar dilatation and version, each case occupying from one to two hours. In the first case convulsions continued for twelve hours, when the patient died. The second case had several convulsions after delivery and recovered. The third case was a multipara with considerable scar tissue in the cervix, was anæsthetized, and an hour or more uselessly spent in attempted dilatation. Finding it impossible to dilate the cervix, he determined upon abdominal Cæsarean section, preferring this to vaginal Cæsarean section, and delivered the child in seven minutes. The whole operation when completed occupied twenty-seven minutes. The case was a six months' pregnancy, and the child was dead when delivered; in fact, the child was dead before the operation was begun. In the fourth case of full term pregnancy the woman had convulsions every fifteen minutes. In this case he did an abdominal Cæsarean section at once, delivered the child in six minutes, closed the wound, and the patient was returned to the ward in twenty-six minutes from the time operation began.

Recently abdominal Cæsarean section with the perfect technique of the present day had materially lowered the maternal mortality, and the operation

was selected not only on this account, but also for the reason that it offered better advantages in saving the life of the child than many of the intrapelvic methods of delivery. The operation was far less dangerous than high forceps version and he believed, vaginal Cæsarean section. Granting rapid evacuation to be the rational treatment, he contended that it was best accomplished by abdominal Cæsarean section.

PRESIDENT'S ADDRESS: LATENT AND ACTIVE NEURASTHENIA IN ITS RELATION TO SURGERY

DR. STUART MCGUIRE, of Richmond, Virginia, emphasized the importance of refusing to operate on a neurasthenic patient unless the symptoms could be plainly shown to be due to organic disease, and he impressed the necessity, if an operation was undertaken on a patient with either latent or developed neurasthenia, of protecting the nervous system from physical or psychical shock, not only by a proper preliminary preparation, but by careful and often prolonged post-operative and post-hospital treatment. If neuroses existed without anatomical disease, an operation would do no good and might result in harm. If neuroses were found coincident with pathological lesions, an operation might prove of great benefit, but in relieving the physical disease care should be taken to avoid increasing the nervous disorder. If neuroses were present, reflex in character and due to remedial causes, an operation might be undertaken with assurance of complete success. In other words, surgeons should divide these cases into three classes: The first to be avoided, the second to be undertaken with caution, and the third to be cheerfully given the relief to which they were entitled.

In discussing the management of neurasthenic patients requiring surgical intervention, he divided the subject into the preliminary examination, the preparation for the operation, the post-operative and the post-hospital treatment. He pointed out the necessity of certain patients remaining for some time at the hospital, and taking a modified form of rest cure, and impressed the point by contrasting the conditions of hospital and home life. The surgeon usually attempted to direct the treatment of patients after they returned home by giving them verbal instructions when they left the hospital, and by subsequently corresponding with them, but the end desired could be more effectively and properly secured by referring the patients back to the family physician. With the rapidly increasing amount of surgery and the consequent number of convalescing patients requiring treatment, an educational move ought to be instituted for the study of the many peculiar factors involved. When surgeons appreciated the influence of neurasthenia on the results of an operation, and the influence of an operation on the production of neurasthenia, when the family physician was educated in the many details of post-hospital treatment, and was given legitimate work with proper compensation, then, and not until then, would there be harmony in the profession, and the greatest good accomplished to the greatest number of patients.

THE DIAGNOSIS OF HYPERTHYROIDISM OR EXOPHTHALMIC GOITER

DR. CHARLES H. MAYO, of Rochester, Minnesota, stated that an effort had been maintained to consider hyperthyroidism a finished product, to be diagnosed as such only within the narrow limits of the imperfect descriptions of the few cases, described by Parry, Graves, and Basedow nearly a century ago. It was not considered that the thyroid played a more important part than the heart or nervous system. Many marked cases failed in some particular and were classed as fruste or pseudo until the lacking symptom appeared. There was a present tendency to drop some of the old classifications and acknowledge that there were various stages: acute, chronic, mild, severe, and irregular forms based upon an increase, probably with some changes of secretion and its delivery. The laboratory findings should show an increase in parenchyma; (a) more cells in the alveoli; (b) more alveoli; (c) papillomatous increase of cells in existing colloid goiter. These changes might be general or in scattered areas. Terminal degeneration of essential organs followed degeneration of the gland in the advanced cases. In this stage the patient might be improved and the disease checked, but not cured, by operation. Forms of myxedema were not uncommon in patients who had survived the hyperthyroidism until degeneration destroyed the major portion of the gland. Eye symptoms and heart signs must be differentiated from chronic Bright's disease, and from myocardial changes. Leukemia of the neutrophilic polymorphonuclears and the percentage and absolute increase in the lymphocytes, should be looked for as diagnostic laboratory aids of some importance. An early diagnosis had become more important since surgery invaded this field than when it was purely medical, in order that a prognosis of the probable result of an operation could be given. In some cases this might mean before eye changes appeared, and in others, before the goiter became a prominent feature.

AN EXPERIMENTAL AND CLINICAL RESEARCH INTO NITROUS OXIDE AND ETHER ANÆSTHESIA

DR. GEORGE W. CRILE, of Cleveland, Ohio, stated in his service they had given nitrous oxide 575 times for major operations. Among these were included many of the hazardous risks in which ether was contraindicated. Comparing the nitrous oxide cases with ether cases nausea occurred in 17 per cent as compared with 42 per cent in ether. This included all cases. Post-operative nausea was, of course, not wholly due to the anæsthesic, i. e., peritonitis and certain visceral operative trauma might independently of the anæsthetic cause nausea. Nausea in nitrous oxide cases in which there was no other nausea producing factor rarely occurred. In the course of the operation, nausea, in nitrous oxide, as in ether, was usually due to uneven administration. At the conclusion of the operation the patient was fully awake and in unclouded possession of all his faculties in two or three minutes. There was unmistakably a great diminution in surgical shock. Indeed, the immunity from shock was as striking in the clinic as in the laboratory.

He was well aware that the shock in the routine cases, free from predisposing complications was rare; but in the cases most urgently demanding surgical relief, such predisposing causes were present, and frequently constituted the principal factor of the immediate risk. It was here that nitrous oxide appeared at its best. Then, too, in infections, since using nitrous oxide as contrasted with ether, they were equally certain that ether as compared with nitrous oxide impaired the immunity of the patient. The difference was so striking that only a great emergency would now induce them to use ether instead of nitrous oxide in grave infections.

In a parallel series of acute infections, consisting of 75 cases operated upon nitrous oxide and 75 under ether, the technique and the after treatment being constant factors, careful records were kept at the time of the operation and in bedside notes. The average pulse observation was here presented. At the time of operation the average pulse of the ether cases was 114; and the average of all the pulse observations during the first 24 hours following operation was 117, while in nitrous oxide the average pulse rate at the time of operation was 115; the average of all the counts during the first 24 hours following operation was 105. In ether there was an average increase of 8 beats; in nitrous oxide there was a decrease of 10 beats. In every other respect also the patient showed a more distinctly favorable course after nitrous oxide than after ether. Not a case showed the rapid march to fatality immediately following the operation as occasionally followed ether.

Nitrous oxide as compared with other general anæsthetics was technically difficult and expensive. It had certain dangers, which were almost wholly in the control of the skilled anæsthetist; it was not the anæsthetic of choice for the uninitiated, but only for the highly trained anæsthetist. Properly supplemented and skillfully given, it might be used as a routine anæsthetic in general surgery. Once the operation was over the patient was strikingly better off than after ether anæsthesia. The role of shock and infection was far less in nitrous oxide than in ether anæsthesia, and accumulating evidence seemed to show that there was a distinct diminution in post-operative neurasthenia.

In routine operations the combination of scopolamin and morphine given one and one-half to two hours prior to nitrous oxide anæsthesia formed so effective a combination that in over 50 per cent of his patients the day of operation was robbed of all operative memory, and in the remainder it dulled the edge of both the physical and the mental distress.

GALL-STONES WITH REFERENCE TO CANCER OF THE GALL-BLADDER

DR. ALBERT VANDER VEER, of Albany, New York, detailed his observations on this subject. Of seventy-seven cases not previously reported, there were nineteen males and fifty-eight females, illustrating the fact that females suffered more than males from gall-bladder complications. The diagnosis before operation of the seventy-seven cases was as follows: Gall-stones, 64 cases, cholecystitis, 10 cases, and gall-stones and carcinoma, 3 cases. Operation revealed a variety of conditions, all of which were given in tabular form. A study of the mortality list impressed the author with the statement that had been made by other operators that stones in the common duct of long standing were very difficult to reach, and the percentage of deaths was much greater here than in simple cholecystotomy, where there were no such complications. The mortality in the latter cases was very small. One case of the group illustrated most forcibly that marked cholemia was not always fatal after an operation.

The experience of surgeons throughout the world during the past ten years indicated that early diagnosis was of the greatest importance to the affected individual. In this connection the author quoted Drs. W. J. Mayo and Charles H. Mayo as follows: "In reviewing the mortality of 1,000 operations for gall-stone disease we have

been impressed with the very fortunate outcome where gall-stones were in the gall-bladder and therefore were complications. In the 1,000 cases there were 50 deaths, or an average mortality of five per cent. The death rate in 820 cases where the disease was confined to the gall-bladder and for benign conditions was three per cent. In 416 cases of simple gall-stone disease the mortality was less than ½ of one per cent. The common duct operations amounted to 14.6 per cent of the whole. In 137 operations for common duct stones the mortality was 11 per cent. In 40 cases, or 4 per cent, malignant disease was discovered, and the operative mortality was 22 per cent. In practically all of these cases gall-stone irritation had been the cause of the development of cancer."

SOME THERAPEUTIC ADAPTATIONS OF CECOSTOMY AND APPENDICOSTOMY

DR. CHARLES A. L. REED, of Cincinnati, Ohio, stated that these operations, now being done largely at the instance of medical men as adjuncts to their treatment of certain otherwise intractable cases, were based upon the principle that disease within the colon called for treatment addressed to the colon. The advantages of this method of access embraced (*a*) exemption of the stomach for medication, (*b*) escape from impairment of the general health from deranged digestion incident to medication, and (*c*) relief from the uncertainty of remedies that had been subjected to indefinite and undeterminable chemical reaction in the upper digestive tract. The anatomy of the parts pointed to cecostomy rather than appendicostomy as the operation of choice. Among the conditions for which ostiomatic operations on the cæcum were now being successfully employed were: (1) amæbic dysentery, in which it opened the way to treatment more phenomenally successful than had heretofore been realized in the history of this malady; (2) chronic catarrhal or mucous colitis, usually very intractable but which, as shown by his own cases, were cured by this method more promptly and in larger percentage than by other treatment; (3) chronic constipation depending upon atony and not complicated with enteroptosis was readily brought under control, as indicated by his own reports confirmed by those of other surgeons; (4) acute septic peritonitis in which, after operation, the cæcum was opened and utilized to flush the colon — "a hot water bottle on the inside" — followed by saline infusion by the drop method — the "coloclysis" of the author, with a record of uniform success in the cases in which he had applied it; (5) defective flora of the colon was remedied by the installation through the cæcal tube of bacilli chiefly of the lactic acid series; (6) autointoxication of intestinal origin was successfully treated by repeated flushings of the colon through the cæcum, the cases recorded embracing cures by this method in chronic headaches, idiopathic epilepsy, rheumatoid arthritis, and pernicious anæmia. The recorded experience of his own and that of other surgeons forced the conclusion that: *First*, the establishment of colonic irrigation through the cæcum, whether by cecostomy or appendicostomy, was a procedure attended with the minimum of surgical risk; *second*, the application of the operation as an adjunct of medical practice was based on the principle of direct treatment of the colon for conditions that were local to the colon; *third*, the results so far realized justified the continued use of the operation and the more extended application of the principle that it embodied.

SUCCESSFUL ENUCLEATION OF A MENINGEAL ENDOTHELIOMA INVOLVING THE MOTOR CORTEX

DR. STEPHEN H. WATTS, of Charlottesville, Virginia, stated that with better powers of diagnosis and better operative methods the number of successful cases of extirpation of brain tumors was constantly increasing, nevertheless they were still of sufficient rarity to justify the reporting of individual cases.

The meningeal tumors were of special interest, since they represented the most favorable cases of surgical treatment. This was due to the fact that they were usually benign, were well encapsulated, grew slowly, and, owing to their superficial situation, were apt to give rise to localizing symptoms.

The following case was one of meningeal endothelioma, a type of tumor which was especially prone to occur in the cerebellopontine region, though here it involved a motor cortex.

Mrs. S. K., aged 33, housewife, was admitted to the University of Virginia Hospital, September 27, 1909, complaining of headache, vomiting, and dimness of vision. Her family history and previous history were unimportant. The present illness began two years ago with convulsions which she described as beginning in the right corner of the mouth, passing to the right arm and then to the right leg, when she would become unconscious. Had had almost constant severe headache which was worse on the left side of the head. Frequent spells of vomiting. Gradual failure of eye sight. Weakness of right arm and left first noticed three or four months ago.

Examination. Sight impaired, but she could count figures held in front of her. Marked choking of both optic discs. There was definite motor

aphasia. Partial paralysis of right side of face and right arm, the muscles of the latter being somewhat atrophied. There was little, if any, sensory disturbance. These symptoms and signs seemed to point to a tumor in the lower portion of the left precentral gyrus.

Operation. October 5, 1909. An encapsulated tumor 3 by 4 cm. in diameter, which proved on microscopical examination to be a meningeal endothelioma involving the arm and face areas of the left motor cortex, was removed. The patient made an excellent recovery from the operation. There was no return of the headache or vomiting and when she was discharged on December 1, 1909, the paralysis of the face and arm had almost entirely cleared up. The most disappointing feature of the case was that the sight improved little, if at all; atrophy followed the choking of the discs. This illustrated the importance of earlier operation in such cases.

INCISIONS TO EXPOSE AND OPEN THE KIDNEY

DR. HOWARD A. KELLY, Baltimore, Md., pointed out the almost universal abandonment of transperitoneal incisions in approaching the kidney and called attention to the vagueness of view in reference to the lumbar incisions. This vagueness or lack of certainty as to the incision was due to the kidney's situation high up under the ribs and close to the diaphragm. The type of incision must vary with the nature of the kidney affection. In simple conditions, such as movable kidney and hydronephrosis, the kidney could readily be luxated; therefore, there was not the same necessity for getting down immediately on the pedicle as there was in dealing with malignant tumors. The author particularly called attention to an important anatomical landmark, the *superior lumbar triangle* and noted that it had been neglected by the anatomists and surgeons. He proposed it as a splendid starting point for all kidney incisions to expose a movable kidney, cutting down on the superior lumbar triangle and pulling the muscles apart with blunt force sufficed. This simple incision which could be the beginning of all incisions could be lengthened by cutting downwards across the lateral muscles of the abdomen, and could be further lengthened by continuing up through these muscles parallel to the costal border to the edge of the rectus muscles. In this way a flap of the thorax could be turned upwards and the upper pole of the kidney and its pedicle directly reached *in situ* without luxation. The cutting of two to three ribs posteriorly facilitated this. The author illustrated his procedure well, and furthermore, described a method of opening the kidney itself in the plane of arterial division by means of a silver wire drawn from the pelvis side towards the convex border.

SURGICAL TREATMENT OF EPILEPSY

DR. W. P. CARR, of Washington, D. C., made a further report of results of twenty operations for idiopathic epilepsy of severe type and long standing. Six of the twenty cases might be called cured, having passed three or more years without seizures. All except one of these six had been well for four years or more. One as long as ten years. With one exception, those not cured were benefited in being free from convulsions for from two to seventeen months, or in having them in much lighter form and at greater intervals. One was not improved. He believed that the operation had not been tried in a systematic way since improved technique had made it possible and safe, and that his results warranted a further trial by surgeons of experience in brain surgery.

The operation consisted in making a large osteoplastic flap and examining the brain carefully for neoplasms, cysts, thickened patches of dura, exostosis, or depression of the skull, and any other abnormal conditions. These should be removed when possible. In many cases nothing would be found but a chronic œdematous encephalitis. Draining of the superabundant serum in such cases gave always temporary and sometimes permanent relief. The operation was safe; no cases have died, and the more extensive explorations had given the best results He had declined to operate upon mild cases having not more than three or four seizures a month, as the subject was still *sub judice* and positive results could not be guaranteed in any given case. But if even one or two bad cases could be cured in a hundred, the operation was justifiable and well worth trial.

He believed that the making of large osteoplastic flaps had done for brain surgery what the Sims' speculum did for gynecology, and that free and extensive examinations of the brain were now possible and safe. Consequently in obscure diseases exploratory craniotomy was as justifiable as exploratory laparotomy for obscure abdominal lesions.

They should no longer allow patients to die from hæmorrhage of the brain, even when the clots were situated at the base or when they could not be located before operation.

He gave details of the operation as done by himself, and exhibited a small trephine fitted to a small brace and provided with a safety shield that allowed it to cut only to the depth for which

it was set. This trephine could be fitted to any brace and rapidly and safely cuts a 5-16th inch hole just large enough to admit the De Vilbis craniotome with which the bone flap was cut. He also exhibited hæmostatic clamps of his own invention for controlling hæmorrhage from the scalp. These clamps were not in the way of the operator, were easily applied, and perfectly controlled the bleeding without damage to the scalp. Considerable time and loss of blood were saved by the use of these instruments, and the shock both from prolonged anæsthesia and from hæmorrhage was lessened materially.

With such methods many operations heretofore deemed impossible became easy and safe. The search for tumors, abscesses and clots, and other lesions was greatly facilitated, and operation in such affections as purulent meningitis and even tubercular meningitis seemed advisable when the patient was not improved by the present treatment. These operations should be done only by surgeons experienced in brain surgery, but in such hands exploratory craniotomy was justifiable and would be done in many obscure cases in the future.

SURGICAL SHOCK

Dr. J. G. Earnest, of Atlanta, Georgia, gave a description of three cases illustrating some of the phases of surgical shock. In the first, very pronounced and profound shock occurred from what would seem to be a trivial cause, uncomplicated with either drugs or hæmorrhage, and seemed to the author to favor the theory of reflex paralysis rather than reflex spasm. The second case was a prolonged fight for life in which the patient was kept alive and finally saved by artificial respiration and electricity. The third case was apparently an illustration of delayed shock.

SKIN STERILIZATION BY TINCTURE OF IODINE

Dr. I. S. Stone, of Washington, D. C., in his paper gave several good reasons for the use of a better method of skin sterilization, the chief of which were as follows: 1. To save time. The patient was ready for operation immediately after sleep was induced by the anæsthetic. No time was spent in washing, etc., which to be effective required at least ten minutes. 2. The patient might be kept warm and dry during the entire seance, including the time of anæsthesia and operation. 3. If the incision must be extended or one made in another place, this quick method was most desirable. 4. The operator's hands might be sterilized with iodine, as the stain could be removed by a weak solution of aqua ammonia.

GASTRO-MESENTERIC ILEUS FOLLOWING GASTRO-ENTEROSTOMY

Dr. Thomas C. Witherspoon, of Butte, Montana, reported a case which taught the lesson, first, of the uselessness of gastro-enterostomy as a means of drainage for a paralyzed stomach. Second, the need of early stomach washing before marked paralysis and dilatation could be detected, to relieve tension and possibly to diminish intoxication. Third, if after several washings the stomach continued to dilate, the necessity of making free drainage by means of gastro-enterostomy should be considered. Fourth, the necessity of keeping the stomach and bowel as free from alimentary material during the first week or ten days after operative procedures on the alimentary canal as the patient's general condition would allow. He believed the nitrogenous foods were the most harmful. He had seen a reasonable number of these cases and he believed the majority of gastro-mesenteric ileus attacks were due to a similar cause, and this case threw light on the entire class. He believed it was reasonably apparent that the attack resulted from a trophic change in the spinal segment which had to do with innervating the stomach. The probability was that injury, operative shock, psychic shock, overfeeding and other causes which upset normal alimentary function or led to intoxication might bring about this condition. The author suggested that every case of gastro-mesenteric ileus which resisted stomach washing should be drained by means of a gastrostomy, and that such a drain be maintained until the stomach wall had regained its tone.

EXTRAPERITONEAL DRAINAGE AFTER URETERAL ANASTOMOSIS

Dr. John E. Cannady, of Charleston, West Virginia, discussed the theoretical and practical value of extraperitoneal drainage after wounds of the ureter. Wounds of the ureter closed rapidly, even though there was considerable leaking of urine from the ureter. There was great difficulty in making an anastomosis of the ureter that would not leak. The author reported a case and described the technique followed in making an anastomosis and rendering the wound extraperitoneal. He spoke of the ease with which the wound was walled off by the sigmoid and parietal peritoneum. The success of the technique described was evinced by the easy convalescence of the patient. The technique described obviated the danger arising from either primary or secondary leakage at the point of union.

Dr. Thomas S. Cullen, of Baltimore, detailed an interesting case of large cystic tumor, developing

from the ilio-psoas bursa, which contained large free cartilaginous masses, and communicated with the hip-joint.

DR. WM. S. GOLDSMITH, of Atlanta, Georgia, described a simple method of excising varicose veins.

DR. RANDOLPH WINSLOW of Baltimore, discussed some acute abdominal conditions in infants, under one year of age. He reported three cases of intussusception in infants; one case of strangulated hernia in an infant three weeks old. He then discussed appendicitis in infancy; congenital hypertrophic stenosis of the pylorus; congenital malformation of the anus and rectum; extensive obliteration or total absence of the rectum; imperforate anus, and cited cases illustrating each condition.

DR. J. E. STOKES, of Salisbury, North Carolina, detailed the symptoms and ultimate treatment of hydatidiform degeneration of the chorion, and reported an instructive and interesting case.

The following papers were also read: "Skin Grafting," by Dr. Arthur C. Scott, Temple, Texas; "Recent Observations on Surgery of the Pancreas," by Dr. Joseph C. Bloodgood, Baltimore, Maryland; "Anatomic, Pathologic, and Clinical Studies of Lesions, Involving the Appendix and Right Ureter, with Special Reference to Diagnosis and Operative Treatment," by Drs. John Young Brown, and Wm. Engelbach, St. Louis, Missouri.

OFFICERS

The following officers were elected for the ensuing year: President, Dr. W. O. Roberts, Louisville, Kentucky; First Vice-President, Dr. Joseph C. Bloodgood, Baltimore, Maryland; Second Vice-President, Dr. Lewis C. Morris, Birmingham, Alabama; Treasurer, Dr. Wm. S. Goldsmith, Atlanta, Georgia; Secretary, Dr. Wm. D. Haggard, Nashville, Tennessee.

Nashville, Tennessee, was selected as the place for holding the next annual meeting.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D.
FREDERIC A. BESLEY, M. D.
WM. C. DANFORTH, M. D.
AIMÉ PAUL HEINECK, M. D.
G. T. COURTENAY, M. D.
WM. R. CUBBINS, M. D.
ARTHUR B. EUSTACE, M. D.
FREDERICK G. DYAS, M. D.
JAMES F. CHURCHILL, M. D.
GEO. E. BEILBY, M. D.

Experiments on Artificial Hæmostasis in Cranial Operations. F. SAUERBRUCH. *Zentralblatt für Chirurgie*, November 20, 1909.

Sauerbruch published three years ago the results of some experimental work along the above lines, in which he made use of positive pressure in the Saeurbruch cabinet, the head of the animal being within the cabinet. He was able to secure venous stasis at a pressure of 20 to 30 mm. Hg. arterial stasis at 70 mm. He noted that the brain itself was much compressed. Injury to the brain and the frequency of air embolism rendered this method entirely impractical.

During the past year Sauerbruch has carried out experiments along the same line by reversing the process, i. e., by placing the body of the animal within the cabinet and subjecting it to a negative pressure. A negative pressure of 20 mm. Hg. was sufficient to entirely control the venous bleeding, so that even the venous sinuses could be opened without danger. Arterial bleeding was not materially lessened by this pressure. At a negative pressure of 40 mm. there was some decrease in arterial circulation.

At the former pressure (20 mm.) the brain was slightly decreased in size and contained little blood. On retiring the pressure, the brain resumed its normal size and bleeding occurred.

As to the physiology, Sauerbruch finds that the negative pressure leads to an increase in the intrathoracic space, with a resulting aspiration of the venous blood from the head. The capillaries and veins of the trunk, especially those of the abdomen, are increased in size, accommodating the blood normally contained in the cranial vessels. Blood pressure in the femoral and carotid arteries is not affected. Pressure on the abdomen causes a return of the venous bleeding at once.

Hæmostasis does not occur when there is marked increase in the abdominal contents (distended bladder, pregnant uterus). Air embolism cannot occur on account of the collapse of the veins. No changes in the brain have been seen.

Whether or not this method can be made of practical value in surgery, Sauerbruch is not prepared to state. However, he considers it at this time, a relatively safe procedure. A further and more complete communication by Sauerbruch will appear at a later date.

J. F. CHURCHILL.

Primary Malignant Tumors of the Great Omentum (Contribution a l'étude des tumeurs malignes primitives du grand épiploon). L. LITCHKOUS. *Annales de Gynécologie et d'Obstetrics*, June, 1909.

Litchkous gives a detailed description of a case of primary malignant disease of the omentum and a short account of ten other cases from the literature, which he believes to be genuine cases of the same condition. His own patient was a woman of 20 years, suffering from pain in the abdomen, with swelling, of two months' duration, associated with diarrhœa, but with no menstrual disturbance. This abdominal enlargement was thought to be due to bilateral ovarian tumors and laparatomy was performed. The large mass proved to be a tumor growing in the lower two-thirds of the left half of the great omentum. A smaller swelling was discovered arising from the posterior layer of the left broad ligament and was densely adherent. Both were removed with the left ovary. The large tumor proved to be a round-celled sarcoma, the cells arranged for the most part in circles, and the blood-vessels, very numerous, having very thin walls.

Litchkous considers this case as one of primary sarcoma of the omentum with secondary growths in the peritoneum. Of the ten cases collected from the literature, five were carcinomata and five sarcomata. As to the origin of primary sarcoma, the author considers (1) the lymphatic glands of the mesentery, (2) the subperitoneal connective tissue, and (3) the external coats of the blood-vessels. He believes his own case to have originated according to this last theory. An effort is made to establish points of differential diagnosis from the clinical findings, and the prognosis is given as invariably bad, recurrence having taken place in all cases where the after history is stated.

CAREY CULBERTSON.

Relation of Iodin to the Structure of Human Thyroid Glands. D. MARINE AND C. H. LENHART. *Archives of Internal Medicine*, November, 1909.

Authors conclude that active thyroid hyperplasia is present in all developing goiters in all animals. All thyroid hyperplasia, so far as they can determine, is anatomically, chemically, and biologically the same. Thyroid hyperplasia develops in both normal and colloid glands.

Colloid glands, anatomically, chemically, and biologically, are the nearest approach to the normal gland that hyperplasias can become, and obey all the known biologic laws of normal glands in so far as these laws are at present known. The various degenerations, hæmorrhages, and cysts are secondary and complicating changes engrafted onto the three fundamental types of normal hyperplastic and colloid glands.

Iodin is necessary for normal thyroid activity. The iodin content varies inversely with the degree of hyperplasia. The percentage of iodin present in the thyroids is variable, but there is a quite constant minimum percentage necessary for the maintenance of normal or colloid gland structure. Iodin is taken up rapidly by the thyroid, the rapidity depending on the degree of active hyperplasia. Mild degrees of thyroid hyperplasia accompany or follow many of the chronic nutritional disturbances without detectable clinical symptoms referable to the thyroid.

Exophthalmic goiter is constantly accompanied during the progressive stage of the disease by thyroid hyperplasia and the iodin percentage varies inversely with the degree of hyperplasia. In endemic cretinism the fibrous overgrowth with atrophy of the gland cells is consequent on active hyperplasia and is associated with very low iodin content.

In myxedema the anatomic and iodin changes are similar to those of cretinism. ARTHUR B. EUSTACE.

Symptoms of Basedow's Disease in Thyroid Neoplasms (Über Basedowsymptome bei Schilddrüsen neoplasmen). ISIDOR LÖWY. *Wiener klinische Wochenschrift*, 1909, xxii, 1671.

After a thorough review of the literature Löwy reports two cases of carcinoma of the thyroid with symptoms of exophthalmic goiter. He then discusses the nature of the symptoms in this condition without arriving at any definite conclusion as to their cause. He thinks that one may doubt their connection with the tumor mass, since they have also been noted in sarcoma. C. G. GRULEE.

The Transplantation of the Thyroid by Means of Vessel Suture (Zur Transplantation der Schilddrüse mittels Gefässnaht). R. STICH AND M. MAKKAS. *Beiträge zur Klinischen Chirurgie*, bd. 60.

These writers operated ten times upon dogs. In three of their cases the thyroid was reimplanted in the same animal from which it had been removed. In the remaining seven it was implanted in another animal of the same species. In all cases in which the gland was implanted in a second animal, all thyroid tissue was previously removed from the animal upon which the transplantation was made. Accessory thyroids, not seldom found in dogs, were removed so far as possible.

Of the three cases in which the thyroid was reimplanted in the same animal two were successful, and at an autopsy in vivo 51 to 245 days later the gland was found in good condition, with a sufficient circulation, and the parenchyma well preserved. The size of the glands had not changed. One of these animals remained in good health so long as the implanted gland remained in place, but after its removal, at a second operation, it showed at once symptoms of tetany, and died in three weeks.

All seven cases of transplantation of thyroids from one animal to another failed.

Conclusions are as follows:

1. It is possible to reimplant a thyroid which has been entirely removed from the body, and which has been kept as long as 1½ hours outside of the body, into the animal from which it was taken, and by vessel suture to cause it to live.

2. This reimplantation is permanent as is shown by a period of observation of an operated case of 245 days.

3. The reimplanted organ keeps not only its normal structure, but is also in condition to carry on fully its physiologic function.

4. The transplantation of thyroids from one animal to another did not succeed. W. C. DANFORTH.

A Disease of the Gall-bladder Requiring Cholecystectomy. B. G. A. MOYNIHAN. *Annals of Surgery*, vol. l, p. 1265.

Moynihan concludes that:

1. There is a condition of the gall-bladder in which fine grains of calculous material are imbedded in the mucosa; the cystic duct is not affected.

2. The wall of the gall-bladder may appear normal. It may retain the blue color of health and the walls are thin and supple. It may be white and thickened slightly or grossly, in part or in whole.

3. No stones are free in the gall-bladder, though particles of grit may be found in the bile therein.

4. Chronic pancreatitis may be present in the more advanced cases.

5. Inspection of the mucosa of the gall-bladder is necessary to reveal the presence of this condition in its early stages; it cannot otherwise be recognized.

6. Removal of the gall-bladder is necessary; drainage of the common duct may be desirable in cases where jaundice has been present.

Moynihan includes three illustrative cases of the above in his article. ARTHUR B. EUSTACE.

Appendicostomy in Conditions of Acute Peritonitis. ERNEST W. HEY GROVES. *Annals of Surgery*, vol. l, p. 1334.

The author summarizes the conclusions to be drawn from his article as follows:

1. The value of appendicostomy in acute diffuse peritonitis is very great in these respects. It serves to introduce saline fluid at will in almost any quantity after operation. The introduction is likely to be more efficient than if given by the rectum, especially in children. It is less disagreeable to the patient and involves less exposure in moving than does rectal infusion. It serves as a ready means of washing out the large intestine, relieving pain, distention, and the retention of toxic intestinal contents.

2. It is rather a quicker and simpler operation than removal of the appendix.

3. The smallest possible piece of appendix should be retained, enough to preserve the sphincter at its base, and no more.

4. It is better not to tie in a tube but to reinsert whenever necessary. ARTHUR B. EUSTACE.

Principles of a Radical Treatment for Proctosigmoiditis. PROF. DR. RAFFAELE BASTIANELLI. *Annals of Surgery*, vol. l, p. 1095.

Bastianelli believes that in cases of stricturing proctitis or proctosigmoiditis, the treatment is to be as follows:

1. Cæcal anus and laparatomy, exploration of bowels.

2. Perineal or combined removal of the diseased section, in one or two stages, with mobilization of sigmoid and colon if necessary, and preservation of sphincter.

3. Closure of cæcal anus.

4. Plastic operation if necessary.

The author emphasizes the importance of resorting more frequently to the abdominal route in the treatment of strictures of the rectum for the purpose of preliminary exploration, and the importance of exact ligating and cutting the arterial supply from the abdomen, even in cases of perineal operation, to prevent any damage to the circulation. ARTHUR B. EUSTACE.

Experiences and Opinions Concerning Suture of Wounds of the Heart (Erfähungen und Ansichten über die Naht der Herzwunden). KARL EWALD. *Wiener klinische Wochenschrift*, 1909, xxii, 1817.

Ewald reports a case with death four weeks after operation from pneumonia. He advises caution in undertaking the operation in fresh wounds, to suture the pericardium completely, introducing a drain only as far as the pericardium, and to disregard pleural wounds unless there is a severe hæmorrhage from the lungs. He thinks the plastic methods of opening the thorax are of secondary value. C. G. GRULEE.

Total Epiploitis Complicating Salpingitis (Epiploite totale compliquent une Salpingite). DR. MAUCLAIRE. *Archives Générales de Chirurgie*, September 25, 1909.

Partial epiploitis limited to the inferior border of the omentum is a condition frequently found in the course of salpingitis. Total or subtotal epiploitis of the same origin is rather uncommon. The author reports a case and discusses other cases which have appeared in the literature. In the case which he reports, after incision of the abdominal wall, he came upon a suppurating omental mass adherent to the anterior abdominal wall and to the right adnexa. The omentum formed a voluminous, sausage-shaped mass lying transversely. That portion of the omentum adherent to the abdominal wall and the right adnexa were removed. Drainage. Discharge of pus for some time. At the end of six weeks, recovery was complete.

Extra-abdominal epiploitis of hernial origin and intra-abdominal epiploitis of appendicular origin have been quite thoroughly studied. Total or subtotal extra-abdominal epiploitis of hernial origin is of more common occurrence than is generally believed Exceptionally, it occurs in voluminous inguinal hernia, but is more commonly met in umbilical hernia and in large eventrations, either of spontaneous or of post-operative origin.

In cases of total or subtotal intra-abdominal epiploitis, the following symptoms are noted in the early stage: Pain, digestive disturbances, anorexia, nausea, vomiting, symptoms of febrile state, peritoneal disturbances, etc. Locally, one feels a hard, distended, painful periumbilical swelling adherent to the abdominal wall. At times one palpates a tender mass, at times a diffuse infiltration more or less adherent to the abdominal wall and inseparable from it. In this, as in other varieties of epiploitis, suppuration and gangrene may be observed. The pus focus may undergo resorption; the omentum being the phagocytic organ "par excellence." The pus collection may become adherent to and evacuate itself into the urinary bladder, into the intestines; may burst through the abdominal wall if the epiploitis be paraumbilical in location. Epiploitis secondary to adnexal disease has to be differentiated from appendicitis, from diffuse and encysted peritonitis, from tuberculous and cancerous peritonitis, etc.

The prognosis is not very grave; spontaneous resolution is nearly always the rule. However, the omentum, owing to the formation of adhesions, may lead to symptoms of intestinal obstruction. Intra-abdominal omental torsion is a possible complication. The author is of the opinion that in the presence of suppurating epiploitis an early incision is indicated. Often, the adhesions to the adnexa are so intimate that it is necessary to remove the adnexa with the omentum. AIMÉ PAUL HEINECK.

Diffuse Peritonitis. JOHN B. DEAVER. *Annals of Surgery*, vol. l, p. 1303.

The author sums up the essential treatment of peritonitis as follows:

1. Early operation.
2. Light anæsthesia.
3. Rapidity of operation.
4. Appropriate treatment of focus of infection.
5. Avoidance of flushing and evisceration.
6. Proper drainage.
7. Simple post-operative treatment by posture and proctoclysis with predigested beef for the purpose of nutrition. ARTHUR B. EUSTACE.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M. D. — RALPH WALDO LOBENSTINE, M. D.
HELIODOR SCHILLER, M. D. — C. G. GRULEE, M. D.

The Surgical Treatment of Placenta Prævia (Placenta Prævia, son traitement chirurgical). R. LABUSQUIÈRE. *Annales de Gyn. et d'Obst.*, July and August, 1909.

The writer's deductions regarding the surgical treatment of placenta prævia are based almost entirely on the clinical conclusions of various operators. He first quotes Sellheim and Krönig, the former of whom recommends extraperitoneal Cæsarean section, while the latter prefers the classical conservative section. Statistics are quoted from each showing results favorable to both mother and child, though the number of cases reported is small.

Baisch, writing from Döderlein's clinic, advocates vaginal hysterotomy, admitting that this operation is of little value to the general practitioner. A. Martin protests vigorously against the newer methods of Krönig and Sellheim and upholds the use of the metreurynter in all cases, fearing that its neglect will cause harm. In none of his cases has J. Veit seen an indication for Cæsarean section. Blumreich found Cæsarean section necessary in but one case out of a series of 74 cases of placenta prævia. In this one case the condition was a rigidity of the cervix. Hannes strongly advocates metreurysis. He quotes 246 cases from Kustner's clinic, none of which was treated by section. The maternal mortality was 6.6 per cent, while 30 per cent of the babes were lost. In this series cases are excluded where the child was dead or not viable before the operation.

Metreurysis is also upheld by Pfannensteil and Thies. The latter, from Bumm's clinic, gives the fœtal mortality of different operations as, 20 per cent in spontaneous delivery; 33 per cent in vaginal tampon or colpeurynter; 80 per cent in combined version with slow extraction; 64 per cent in combined version with rapid extraction; 50 per cent in vaginal Cæsarean section; 14 per cent in metreurysis. Zimmerman collected a series of cases treated by the metreurynter in which the maternal mortality is 33 per cent, the fœtal, 23.7 per cent. In 28 cases of his won there was a loss of neither mother nor child. Newall considers early diagnosis the important factor in the successful treatment of placenta prævia. He rather favors combined version with slow extraction, but admits the value of Cæsarean section in certain cases. Mason and Z. Williams advise Cæsarean section for primiparæ but for multiparæ combined version with rapid extraction. Labusquière finally gives a summary of the discussion on this subject at the recent meeting of the American Gynecological Society. He concludes that Cæsarean section is only occasionally necessary and then done only under favorable conditions and by competent operators. Judging by the results obtained in the Clinique Bandelocque, where the method employed is to rupture the membranes and insert a de Ribes' bag, the writer believes also that the indications for hysterotomy must be exceptional. CAREY CULBERTSON.

Some Remarks on the Clinical Picture of the Climacteric, Functional Disturbances of the Glands with Internal Secretion (Einige Bemerkunger zum klinischen Bilde des Klimacteriums Funktionsstöumgen der Drüsen mit innerer Sekretion). ANTON GLUZIŃSKI. *Wiener klinische Wochenschrift*, 1907, xxii, 1663.

Gluzinski believes that the atrophy of the ovaries at the time of the menopause is frequently associated with a more or less prolonged inhibition of the thyroid secretion resulting in myxedematous symptoms of slight or severe degree, such as roughness and dryness of the skin, clumsiness, weakening of the mental powers, tendency to obesity, etc. He cites several conditions which would tend to show some interdependence between the function of the thyroid and that of the ovaries, but cautions against a too wide application of his theory.
C. G. GRULEE.

Extract of Corpus Luteum in Disturbances of Artificial and Physiologic Menopause. MORLEY. *Journal of the Michigan State Medical Society*, November, 1909.

The author reports his results in eighteen cases. This report is a continuation of the one that appeared in the August number of the *Detroit Medical Journal*. The author used an extract made from the corpora lutea of beef ovaries rather than an extract of the entire ovary, as the censensus of opinion seems to be that the internal secretion of the ovary is produced by the yellow body. The extract is given in five-grain doses, three times a day, one-half to one hour before meals. His results in eighteen cases may be summed up as follows:

Five were cured, twelve were improved and one obtained no relief. Included in the twelve cases that were improved are grouped these that are still taking

the extract. A permanent cure may result in a few of the cases under treatment. Of the eighteen cases, fourteen suffered from disturbances of operative or artificial and four from those of natural or physiologic menopause. While the results obtained in so small a group of cases do not warrant the drawing of any definite conclusions, still the author thinks that the results are favorable enough to justify a continuance of the treatment in other cases, where there is disturbance incident to artificial or physiologic menopause.

The Secretion of Antitoxins and Precipitinogen through the Milk of a Passive Immunized Mother. DR. SOHMA. *Monatschrift fur Geburtschilfe und Gynækology*, bd. xxx, h. 4.

Sohma investigated to learn whether the antitoxin which, as Ehrlich showed, can be found in the milk of the nursing mother animal, remains fixed to the albumen of the animal, from which the serum came, or whether it passes over to the albumen of the animal that was passively immunized. The experiments showed:

1. In the milk of animals injected subcutaneously with tetanus antitoxin of horses, antitoxin or serum-albumen of horses is present.

2. According to the amount of serum injected, one part or even the whole amount of the antitoxin remains fixed in the albumen of horses.

3. The serum of the suckling nursed by an animal which was passively immunized does not contain any, or only a very minimum, trace of tetanusantitoxin or horse-serum quite the contrary to the finding in the actively immunized mother. HELIODOR SCHILLER.

The Causes of the Child's Position and the Relation to the Uterus (Die Ursachen der Kindeslagen und die Turnkunst un Uterus). SCHATZ. *Prager Medizinische Wochenschrift*, 1909, xxxiv, 655.

Schatz regards the uterus as a sac with three funnel-like corners. About two months before birth the child turns itself by extending the leg on the thigh and as a consequence the foot slips into one of the upper funnels and propels the body around the buttocks as a sort of axis. Where the fœtus is small or there is an excess of liquor amnii the propulsion takes place not only with the leg but with the thigh also, and as a consequence malpositions are more frequent.

C. G. GRULEE.

On the Treatment of Puerperal Convulsions. HERBERT M. LITTLE. *Journal of Obstetrics and Gynæcology of the British Empire*, September, 1909.

Little's article is based on the records of the Maternity in Montreal since 1905, 43 patients having had convulsions out of 2,350 cases. Of these 43 patients, the author considers but 40 as genuine eclamptics and bases his observations on the study of them alone. Twenty-one of the patients developed convulsions before term, ten at term, and nine after confinement. Albuminuria was present in all cases and the pelvis was normal in every instance. Persistent nausea and vomiting was frequently noted, but disturbed vision was observed but once. The blood pressure varied between 125–200 mm. Four of the cases (10 per cent) died.

As regards treatment, delivery as speedily as possible was accomplished as follows:

Spontaneous delivery	4
Spontaneous delivery after induction of labor	1
Forceps, after complete dilatation	2
Vaginal Cæsarean section	1
Pomeroy bag and forceps	2
Pomeroy bag and Braxton-Hicks' version	1
Dilatation — Edgar Bonnaire — with forceps	4
Dilatation — Edgar Bonnaire — with craniotomy	1
Dilatation — Harris — with forceps	8
Dilatation — Harris — with version	6
Version and extraction	1

Fifteen patients were immediately delivered; of these one child was not viable, and one was dead in utero upon admission. Of the remaining thirteen, twelve live babies were obtained = 92 per cent. Of the sixteen patients not immediately delivered, two babes were dead in utero and one was not viable. Of the remaining thirteen, but three live babes were obtained, 23 per cent. This gives a difference of 69 per cent in favor of the child when immediate delivery is effected.

The morphia treatment of the rotunda was employed in one case, one of the fatal ones. Three patients had veratrum, and chloral was given in a few cases, both with indifferent results. Nitroglycerin and pilocarpin were not used. Vaginal section is considered as indicated only where the cervix is so rigid as to be undilatable by other means. Tears of the cervix occurred frequently, only three not being appreciably damaged and repair by suture being employed in nine cases following delivery. Sweating was induced with the hot pack and hot air bath, and venesection was employed in certain conditions. Fluid is given freely and magnesium sulphate is the favorite laxative.

In conclusion Little suggests the following rules:

1. Minimize the use of narcotics and anæsthetics. Chloroform is rarely indicated for control of convulsions, but should be used where general anæsthesia is is required for examination or delivery.

2. Immediate delivery is advisable, particularly when the child is viable.

3. In the majority of cases the onset of labor is more or less intimately associated with the onset of convulsions; accouchement forcé — preferably Harris's method followed by version — has given the best results.

4. Immediately after delivery, if not before, the stomach should be washed out, and several ounces of magnesium sulphate, well diluted with warm water, should be introduced through the tube. The patient should then be sweated by means of a hot air bath or hot pack.

5. If convulsions recur after delivery, and particularly in post-partum eclampsia, the best results are obtained by withdrawing 700–900 cc. of blood from one of the veins of the forearm.

6. A large quantity of fluid (forced fluids) should be given for several days, and the amount so given

should be carefully tabulated for comparison with the amount of fluid eliminated in the urine and stools. If the excretion is inadequate, repeat the sweating and purgation. Do not allow the patient to become water-logged.

7. Careful records of ingestion and excretion should be kept for at least ten days, as the involution of the uterus has a marked effect on the general metabolism, particularly between the sixth and ninth days.

CAREY CULBERTSON.

The Technique of Extraperitoneal Cæsarean Section and Delivery through a Uteroabdominal Fistula. HUGO SELLHEIM. *Beitr. z. Geburts. u. Gynaek.*, bd. xvi, h. 1.

The classic Cæsarean section is a reckless operation when the operator does not take into consideration the modern principles of asepsis, the avoidance of injury to an organ whose function might be impaired, and the avoidance of hæmorrhage. Therefore, the technique needs improvement, the more so as its results in infected cases are *nil*. The classic Cæsarean section injures the center of the uterus instead of the part naturally predisposed to expansion — the cervix and isthmus. The injury will doubtless be less significant if made in a part more protected by nature and physiologically less important, and the hæmorrhage can be more easily controlled. The cervix of the non-pregnant uterus has less blood-vessels than the fundus. The difference increases during pregnancy through the development of the placenta in the fundus. The isthmus and cervix remain comparatively lacking in blood-vessels. An incision here has the further advantage of avoiding the peritoneum.

Based upon many anatomical preparations, the author now describes the shifting of the peritoneum of the bladder to the uterus in the pregnant. He shows how the lower part of the uterus becomes to a large extent extraperitoneal, how the growing uterus draws the peritoneal covering of the bladder upwards, and how towards the end of the pregnancy, the bladder lies extraperitoneally upon the uterus and vagina, thus opening a way for an extraperitoneal incision. While variations of this are found, it is nevertheless the rule.

The first step for his extraperitoneal section is a steep Trendelenburg position, the bladder is emptied, Pfannenstiel's incision made. The next step depends upon the condition of the peritoneum of the bladder. A small incision in the peritoneum, which is immediately very securely closed, will clear the situation. Nearly all of the peritoneum of the bladder is pulled upward by the uterus, and this is the rule. Then it will be an easy matter to get extraperitoneal access to the isthmus and cervix. If, however, a part of the peritoneum is tightly attached to the bladder, then the author advises, in order to avoid injury to the bladder, to leave it, to circumcise it, and to sew the defect of the peritoneum securely. The peritoneum of the uterus is now pushed upward, by means of a sponge, as far as possible. The flap of the peritoneum originally attached to the uterus is now sewed towards the parietal peritoneum of the transverse incision, making the new plica vesico uterina. This part is now pulled as far as possible upward, the bladder pulled downward, thus exposing an extraperitoneal space of the uterus about 15 cm. long. The lowest point of this might be the external os or vagina, or the cervix. The wall of the uterus is now incised between two tissue forceps, the wounds are grasped with arteric forceps. The lower down the incision is made, the less hæmorrhage is encountered. It can be avoided completely if the incision is made between arteric forceps, but it will often become necessary to remove the clamps before the delivery, for lack of space. The head of the baby is now pushed by means of the fingers into the wound. If this is impossible, forceps or version might be employed. After delivery ergot is injected, the placenta if necessary expressed or the uterus packed, exact closure of the incision by through and through stitches, with an eventual second row of suture. The next step is to sew the artificially raised plica vesico uterina downward, the bladder upward into its place and close the abdominal wall. The puerperium is in most cases as simple as in a normal confinement.

In regard to the best time for this operation the author says: In the anticipation of the indications rests the result of it, the earlier the better, and better too early than too late, however, always before the natural powers go bankrupt.

This method will enable us to operate upon cases in which other operations, as forceps, have been previously used in vain, cases which contraindicated the classic Cæsarean section. A manifest infection, however, is a contraindication of the extraperitoneal section on account of the danger of infecting the large exposed connective tissue of the pelvis. For these cases in contracted pelvis, perforation is indicated. In two cases Sellheim established a uteroabdominal fistula with good results. He made a long incision in the linea alba, sutured the parietal peritoneum securely to the skin, cut the peritoneum of the uterus, sutured it to the parietal peritoneum, and incised the wall of the uterus,— the membranes are ruptured beforehand through the vagina — the wall of the uterus was grasped with arteric forceps and pulled before the abdominal wound. After delivery of the baby the cut ends of the uterus are sewed to the skin. The fistula will close sooner or later. If not, it will become necessary to mobilize the wall of the uterus and close it by a suture. This proceeding will enable us to operate infected cases and preserve the life of mother and child.

HELIODOR SCHILLER.

BOOK REVIEWS

A Textbook of General Bacteriology. By Edwin O. Jordan, Ph. D. Philadelphia and London: W. B. Saunders Company, 1908.

This book is the outcome of lectures given to the students of the University of Chicago (Rush Medical College) during the past few years.

The author says the subject is one that he believes should find a place in every general scientific course. Bacteriology is chiefly of professional interest to medical students, but the subject also bears technical relation to household administration, agriculture, sanitation and sanitary engineering, to various industries and technological pursuits. For the general scientific student and reader bacteriology presents certain aspects that tend to widen the outlook upon a variety of human interests.

A Handbook of Medical Diagnosis. By J. C. Wilson, A. M., M. D. Philadelphia and London: J. B. Lippincott Company, 1909.

While to the making of books there may be no end, still from time to time contributions to medical literature appear that mark stages in the development of our knowledge of this science. In the present volume of 1,400 pages, Wilson has produced a work which cannot fail to stand as a monument to his own painstaking care as well as mark the distinct progress that has been made in the last decade to our increased knowledge of the methods of diagnosis. It is clearly and concisely written, yet covers with sufficient completeness all phases of the question of medical diagnosis. The general heads, Medical Diagnosis in general, Methods of Diagnosis and their Immediate Results, Symptoms and Signs, comprising the first 600 pages, include a most satisfactory discussion of all these various phases, while the clinical applications covering the various diseases serves to emphasize in the individual affection the various principles which he has detailed so clearly, earlier.

Another point which is worthy of commendation is that the various pictures and drawings which are introduced serve in each case to illustrate vividly some vital point. There is none of the introduction of photographs simply to fill up space. Also, the colored plates, particularly those of the blood, are clear representations of the microscopical picture found in stained specimens, and gives the student a satisfactory idea which so many of the colored plates ordinarily seen in text-books fail to do.

The modern phases of diagnosis, such as the opsonic index, the use of the X-ray, and serum diagnosis, has received adequate mention.

In every way the book can be recommended to students and the practitioner.

Physician's Pocket Account Book. By J. J. Taylor, M. D. Philadelphia: Medical Council.

This account book seems to possess a number of advantages over the majority of those on the market. It can be started at any time during the year and be used until filled. The entries are made in writing, not in signs. It is of convenient pocket size, bound in limp leather.

Principles and Practice of Physical Diagnosis. By John C. Da Costa, Jr., M. D. Philadelphia: W. B. Saunders Company, 1909.

Da Costa has written a clear, concise text on the principles of physical examination and their application in the diagnosis of disease of the thorax and abdomen. The exploration of the physical signs on the basis of the underlying pathological condition is one of the strong features of the work.

The book is written by a man who has evidently had a large amount of teaching experience and who has first had knowledge of the needs of the student.

The illustrations are good, being for the most part original photographs of patients, models, and pathological specimens.

The book is unusually brief for one on physical diagnosis and can be recommended as a text-book for medical students and as a reference book for the general practitioner.

BOOKS RECEIVED

A System of Syphilis. Volume III. Edited by D'Arcy Power and J. Keogh Murphy. London and New York: Oxford Press, 1909.

Practical Medicine Series. Volume IX. Skin and Venereal Diseases. By William L. Baum, M. D., and Harold Moyer, M. D. Chicago: The Year Book Publishers, 1909.

A Practical Treatise on Ophthalmology. By L. Webster Fox, M. D. New York and London: D. Appleton & Company, 1910.

Diseases of Children. Edited by Abraham Jacobi, M. D. New York and London: D. Appleton & Company, 1910.

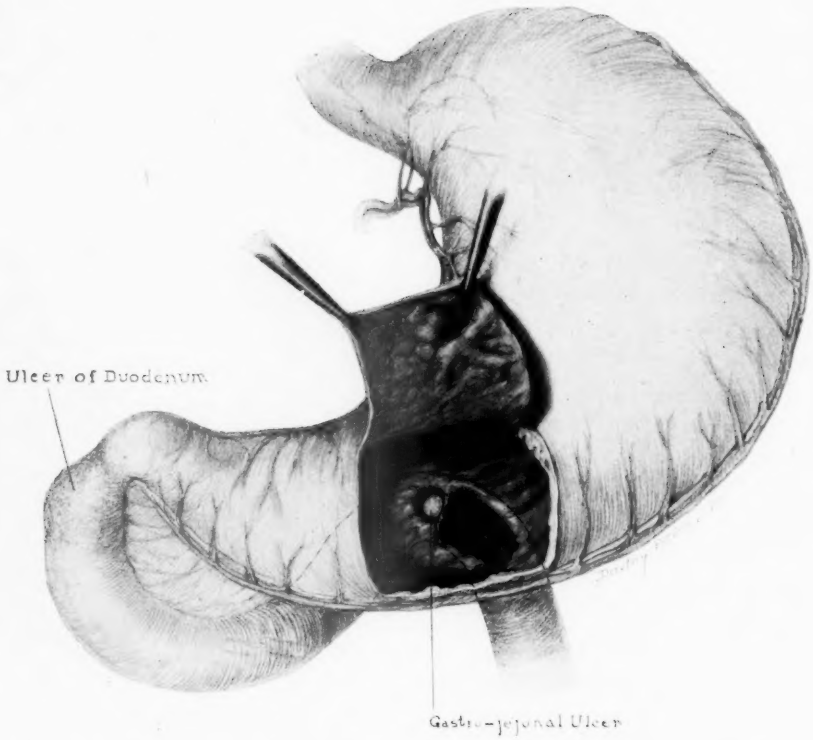


Fig. 1. Gastrojejunal ulcer, the result of infected hæmatoma. (Case 3.)